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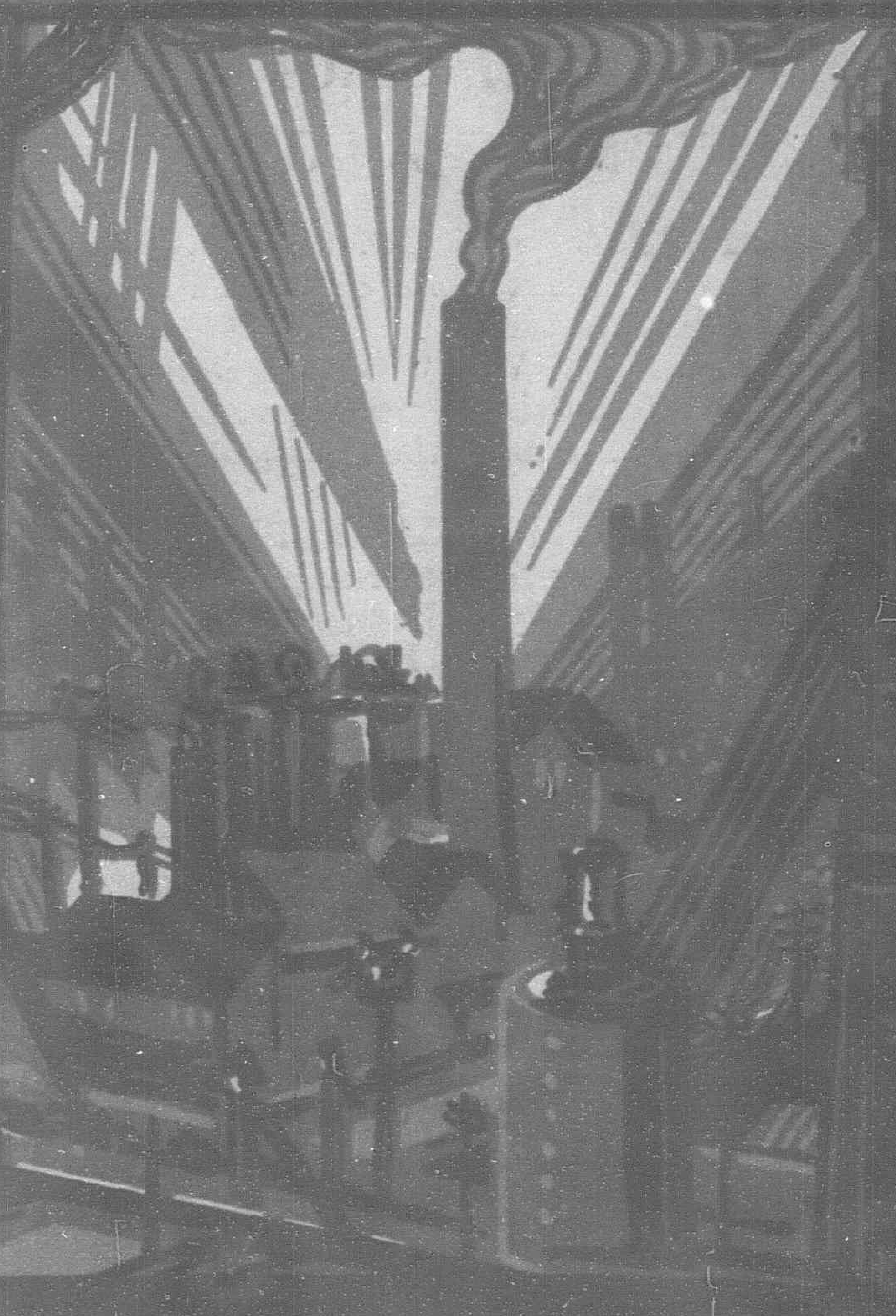

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遠東時報

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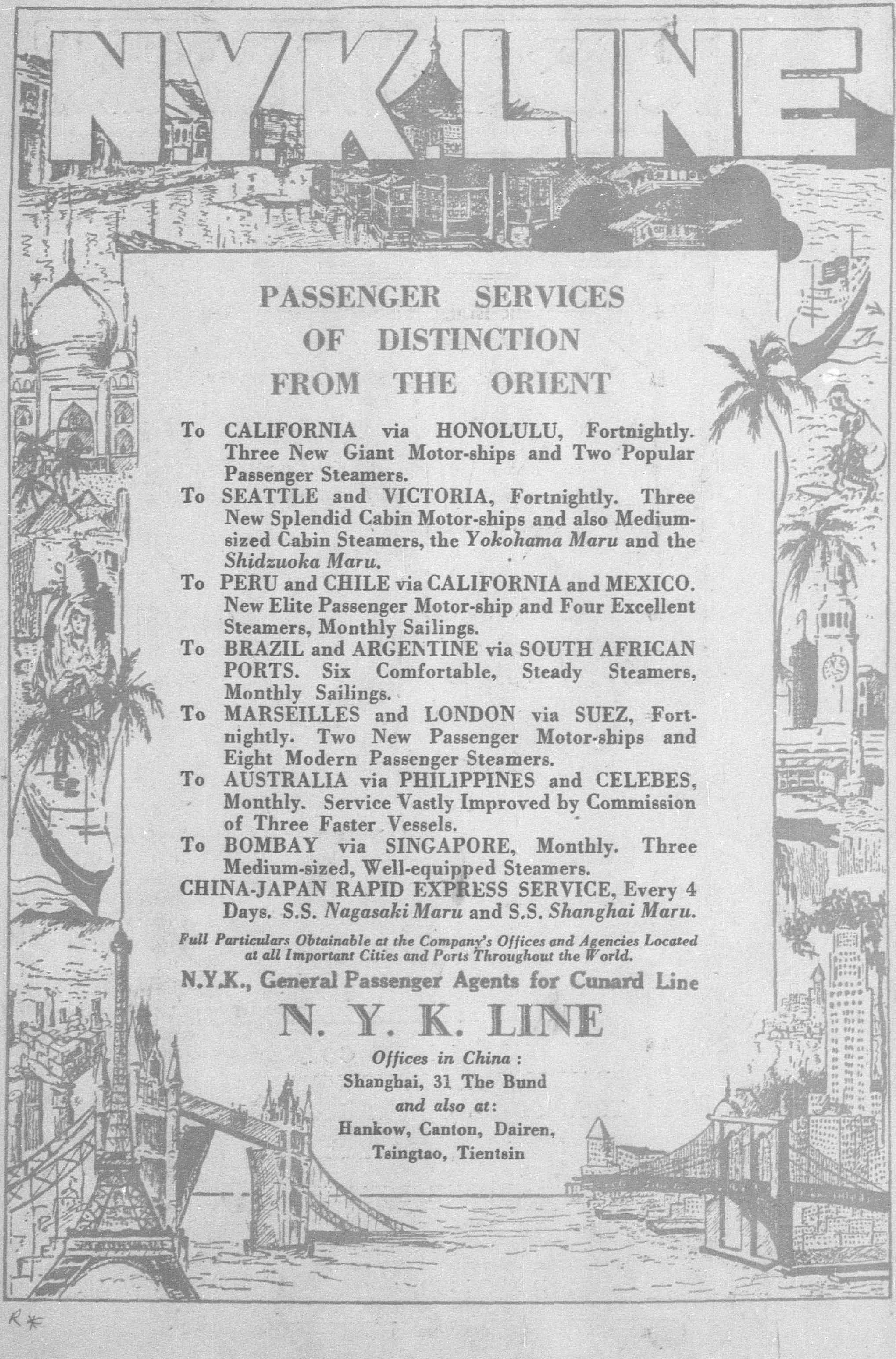

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXVII SHANGHAI, DECEMBER, 1931 No. 12

Militarism Must Go!

CHINA's armies total nearly three million men, outnumbering the combined regular forces of all other nations. Theoretically, China is the foremost military power in the world.

The Nine Power Treaty guarantees China against any impairment of her sovereignty or territorial integrity. The Power that violates these principles becomes, under the treaty, an outlaw, with whom no other nation may even enter into treaty relations.

The Kellogg Pact reinsures her against war; the League of Nations is her Fairy God Mother protecting her from all insult and merited chastisement.

Possessing the largest army in the world; safeguarded by every instrument that international law can devise; arrogating to herself the use of the League's weapon of last resort; China refuses to comply with her treaty obligations or discharge her duties as a state and when, in sheer desperation, another nation is compelled to defend itself, she falls back on the League and demands that the other Powers fight her battles for her.

As long as outside Powers will fight each other over China, her vast armies will make no move in self-defense. But as soon as the menace from without disappears, these armies will once more start marching and counter-marching across the face of China, terrorizing, outraging, enslaving and slaughtering the defenseless people.

If the other Powers, either through diplomacy, the application of international law, the use of their armies and navies or their economic weapons are to defend China from the consequences of her own disorganization and ineptitude; if she is to become the ward of the nations under the Peace Pacts; these three million useless troops must be disbanded. Militarism in China must go. Otherwise, these armies will remain a constant menace to world peace, a constant provocation to war and internal revolution, an insurmountable obstacle to the financial rehabilitation of the country and foreign trade recovery.

If the recognized National Government of the Republic of China is unable by itself to restore law and order; if it cannot bring work, food and hope to the two-million "hungry people" organized into bandit and communist armies; then it is squarely up to the League of Nations and the interested Powers to devise some plan that will justify their friendly intervention in the affairs of China in behalf of outraged Civilization and world security.

For, let there be no mistake about it. China is seething with discontent. The despairing masses are being organized into Soviet communities and planning to exact a bloody retribution upon those who have elevated themselves to power by frightful slaughter and terrorism.

We have no illusions about the ability of Canton or Nanking to re-establish law, order or a strong civilian government. The scheming politicians of the Kuomintang have waited too long. The party founded by the Great Leader, which was to have led the Chinese people out of their misfortunes, has outlived its usefulness. The revolt of the masses against their further enslavement cannot be long deferred. We are living on the brink of a volcano.

It is our duty to the business men of the world to point out these facts. It is their duty to bring pressure upon the League and the Signatories of the Kellogg Pact to act while there is yet time. Either some effort must be made to stabilize China from the outside by the friendly co-operation of all the Powers, or we must expect another upheaval that will complete the ruin that the last ten years of misgovernment has brought upon this unfortunate country. Japan sees the end coming and is wisely protecting her own vital interests in Manchuria.

The Key to World Prosperity is peace, justice, law, order, good government and the abolition of Militarism in China.—G.B.R.

Daylight in Manchuria

If we admit that the League's resolution for the settlement of the Manchurian dispute averted the danger of a general war between China and Japan and preserved the world from another catastrophic conflict, even its most hostile critics must render it due praise and congratulate the Council on the outcome. But to accept such a conclusion implies that another major war was really imminent and that Japan was ready to break all her treaties and risk world condemnation and ostracism by waging an offensive war upon the whole of China instead of confining her activities to defending her legal rights and position in Manchuria. Or, if China had the resources and was prepared seriously to carry out her oft-repeated threats and march her mighty armies northwards to give battle to Japan instead of throwing her whole case unreservedly into the League and signifying her willingness to abide by its decision, there might be some justification for the assumption that the League has preserved the peace of the world. To argue otherwise is to lose sight of Japan's repeated declarations that she acted in self-defense and was willing to withdraw her guards into the railway zone as soon as certain basic conditions were agreed to by China. Under no provocation, short of an invasion of Korea or the Leased Territory by Chinese forces, would Japan wage war upon the whole Chinese nation.

The League's resolution therefore did not avert a general war, but it did provide the opportunity for China and Japan to get together and solve their dispute by direct negotiation, something that China could have done at any time during the past ten years had she been so disposed. The resolution as it stands is perhaps the only one that the League could have made and preserved its existence and usefulness. It was pure folly for China and League enthusiasts to harbor the idea that the League would resort to force or sanctions to punish Japan for applying her recognized right of self-defense in a sphere she holds as vital to her security. The League's function is one of conciliation and had its Secretariat remained neutral at the outset instead of using its organization as a propaganda organ for China, much of the criticism and distrust directed against it would have been uncalled for. A League war, either through the employment of armed force or by an economic or diplomatic boycott will have the same catastrophic results as any war between great powers. Such a war would be futile. No self-respecting people crushed by the overwhelming forces of the rest of the world would regard defeat as proof of their iniquity and especially in the case of Japan, where the whole country is united and convinced of the righteousness of its cause. A League war would leave more resentment behind it than a private war because of the indignation of the vanquished at being treated as criminals.

If the League should ever use its machinery and powers to start a war against any first class power, it would destroy itself, and with it would go the hopes of the world. The time may come when the fate of nations will be entrusted to a super-state, but it is still a long way off. That wiser counsels prevailed as the facts of the Manchurian situation slowly percolated into the minds of the League statesmen, and that an effort was made to undo the mistakes of the first emotional reaction, is a sign that the Council realized that it was inviting the very calamity the League was created to avert.

The problem is unique. There is nothing like it in Europe or America. There is nothing like it in the history of the past century. The rules which apply to two states in Europe that go to war are not applicable to Manchuria. The roots of the dispute between China and Japan are embedded deeply in the events of the past, a puzzle of secret treaties, railway agreements, loans, juridical rights, investments, security and a host of other complications inextricably mixed up with a paper sovereignty on one side and national honor, dignity and defense on the other, all making a case that seems almost beyond the power of the human mind to disentangle with justice to either side.

However strong and legal the Japanese case, the Chinese counter by denying practically every fact which Japan or her spokesmen put forward. There are no facts that can serve as basic evidence in rendering a verdict. If Japan contends that she won the war against China in 1895 and was entitled to the fruits of her victory as conceded by China in the treaty of Shimonoseki, the Chinese accept the intervention of Russia, Germany and France which restored to her what she had ceded outright to Japan, as their own diplomatic victory.

Does Japan cite the Li-Lobanoff secret treaty of alliance of 1896 as proof of China's hostility and aggression against Japan and as making her responsible for the Russo-Japanese war, the Chinese simply explain it away by saying that Russia violated and vitiated the alliance in 190[illegible] and they cannot be held responsible for what followed. They admit the fact but reject responsibility for the consequences. Does Japan declare that in 1903, she secured from the Chinese Government an agreement to leave the settlement of the Manchurian question to Japan and Russia and that Japan's right to a voice in the destiny of this part of China's territory was secured by China's explicit and willing consent and that because of this agreement Japan fought Russia and then restored to China her lost sovereignty over Manchuria; the Chinese are mute. They know nothing about this agreement.

Does Japan base her railway rights in Manchuria on the 1905 protocol, the Chinese reply that it was never signed by the Chinese Government and that the initials to the agreement respecting parallel lines is a forgery. Does Japan insist upon the validity of the 1915 Treaty upon whose provisions rests her whole position and rights in Manchuria, the Chinese answer that the treaty was extracted under duress and they will never recognize it. Does Japan contend that the ultimatum was invited by Yuan Shih-kai, the Chinese ridicule and deny it.

Does Japan demand that certain loan advances amounting to millions of yen secured upon Manchurian railways be repaid, the Chinese respond that these loans made to a former Peking Government are illegal and cannot be recognized. Does Japan request that funds advanced for the construction and equipment of other Chinese railways in Manchuria be repaid, the Chinese simply decline to discuss the matter and delay for months the opening of negotiations.

And so it is all along the line. In every essential feature of the Manchurian dispute since the signing of the Li-Lobanoff treaty of alliance in 1896, the basic facts upon which Japan's case are built up are either challenged or denied outright by China. There is nothing to grab hold of to form an intelligent basis of discussion. This is what makes any peaceful solution of the Manchurian problem difficult and almost impossible. The League commission that is to be sent to Manchuria to study on the spot and report to the Council on any circumstances which may affect international relations and threaten to destroy the peace between China and Japan or the good understanding between them on which peace depends, will be on the job until Doomsday if it carries out faithfully and intelligently its instructions. There is no peace or good understanding between China and Japan and there never will be if the Manchurian problem is settled to the satisfaction of any one side.

Korea is Japan's Ireland and Manchuria her Egypt. There is no hope of a permanent understanding with China unless Japan is willing to surrender the Liaotung Peninsula, withdraw her troops from Manchuria and be relegated to the position of a second-rate power dependent upon the good-will of China for her economic and strategic security. Then China will condescend to be a good friend to Japan. This, of course, Japan will never consent to. Here is a case where outside intervention will never solve the problem. It has been tried and has only complicated the issue and thrown the two nations farther apart. Only by direct negotiations between the two interested parties can any lasting working arrangement be arrived at. The use of force by Japan will not help her with a people maintained in ignorance of the real facts and fed with the raw meat of national propaganda into believing that Japan is their implacable enemy determined to conquer and annex their territory and make slaves of them.

The League has perhaps justified its usefulness by holding both China and Japan down to an observance of the peace pacts, but its real task now begins. The League took a gamble and must see it through. As pointed out in other articles in this issue of *The Far Eastern Review*, neither the Kellogg Pact or the Nine Power Treaty can be fairly applied to the Manchurian dispute. They cannot be invoked without injustice to Japan. The machinery of the League is all that remains, but if this machinery is to be used to coerce Japan while permitting China to exploit the situation, it will break down and carry the League to ruin with it.

Once China understands that the dispute is one which must be settled by direct negotiation based on the recognition of Japan's rights and Japan also understands that there is a limit beyond which she cannot go in self defense, some temporary compromise is possible. The continued peace of the Far East will then depend upon the future moves of Soviet Russia.

A new cabinet has come into power in Tokyo and a new civil government is in the making at Nanking. Chiang Kai-shek and his military co-ruler, Chang Hsueh-liang have resigned their positions. They may come back stronger than ever, but in the meantime the way is cleared for a new approach on the part of China to a settlement of the Manchurian dispute. There are indications that the new Cantonese group of statesmen have a more " statesmanlike " program for dealing with the problem and as long as Japan recognizes China's sovereignty over the province and China recedes from her uncompromising position over the validity of the 1915 treaty, there is some hope for peace and understanding.

If Japan's drastic action in Manchuria results in the permanent elimination of Chang Hsueh-liang as a factor in Chinese politics and his military partner Chiang Kai-shek is subordinated to the civil power, a real unification of China is now possible without resorting to another disastrous civil war. Put that in the scale against Japan's actions in Manchuria ; recognize frankly and fully her past sacrifices in preserving the territory to China ; admit her undeniable right to security in a region where for the present China is powerless to discharge her international obligations and where both countries are menaced by the same danger ; recognize without reservations the economic interests that Japan has created with her own capital; invite her further co-operation in developing the territory and strengthening its defenses ; recognize the right of the people of Manchuria to apply the doctrine of self-determination to set up their own government and choose their own rulers ; (even though at the outset they may have to receive the endorsement of Japan) and there is no reason why both nations should not emerge from the present impasse with credit and honor to both sides.

As long as Japan recognizes the principles of the Nine Power Treaty and lives up to her pledge to respect the territorial integrity of China, the road toward peace and complete understanding is wide open. There is no use of opening the grave of forgotten things and re-examining old issues. This only leads to another impasse. There is nothing to grab hold of and the Chinese people would never be permitted to know the facts or would they admit their force if they were told. There is no public opinion in China, nothing but a mass emotion which no appeal to reason can influence. To submit these questions to outside arbitration would keep the League or the World Court in continuous session for a period of years, to the exclusion of all other important world matters. Even then, any decision handed down would fail to satisfy both nations.

China's unyielding revolutionary diplomacy as practiced by the Chiang Kai-shek régime, supported by the possession of vast armies, constituted a display of militarism and a constant provocation to war. The sabre-rattling of Chiang Kai-shek and the war-like utternaces of his foreign minister all tended to create in the minds of the Japanese that China was preparing to use force in the settlement of the Manchurian question. The Japanese dared not assume that the Chinese would not fight and it is most unconvincing for the latter to declare that their armies were instructed to lay down their arms if attacked by the Japanese.

China faces a new outlook. With the elimination of the military from the control of the government and the ascendency of men who profess to hold broader and more liberal views as to a solution of the Manchurian question, it is only a question of time, patience, forbearance and conciliation when China and Japan will come together in a new understanding that will lay the foundation of a great and glorious future for both nations. China and Japan must come together and any attempt to exacerbate relations between them by unduly taking sides is a disservice to humanity, a crime against the peace of the world. There is an honorable basis for a new understanding between the two countries. Within the principle of unqualified recognition of China's full sovereignty in Manchuria any compromise or working agreement should be possible to satisfy Chinese nationalism while recognition of Japan's legal rights and, pending the ability of the Chinese to discharge their international obligations in this cock-pit of the races, the recognition of Japan's fundamental right of security and self-defense, should satisfy the people of Japan. The League has left the door open for the two nations to settle their disputes peacefully by direct negotiations. The issues involved do not otherwise concern the rest of the world. The practical aspects of the situation overshadow the legalistic. The world is facing a condition in Manchuria, not a theory, and it may take years before the basis for a pacific settlement is found. The League should avoid trying to rush through a settlement between China and Japan when negotiations between China and Russia over the same questions have dragged along for nearly two years without reaching any basis of agreement.—G.B.R.

Aluminium in Japan

Trade Commissioner WILLIAM S. DOWD, Tokyo

THE expansion of the aluminium-fabricating industry in Japan increased imports of aluminium from 5,500 tons in 1927 to 11,473 in 1930. Imports of aluminium ingots, slabs, grains, plates, and sheets amounted to 20,587,600 pounds in 1928, 27,124,411 in 1929 and 25,815,302 in 1930. At the beginning of the present year a drop was recorded, from 850,424 pounds imported in December, 1930, to 295,029 in January, 1931.

Japanese exports under this class, while smaller in quantity, have grown more rapidly than the imports and totaled 365,942 pounds in 1928, 906,520 in 1929 and 1,533,092 in 1930. The decline in the first month of 1931 was smaller, from 35,400 pounds in December to 28,974 in January.

The Japanese Department of Commerce and Industry, with the Army and Navy, has had under consideration the construction of reduction plants at Saga and Toyama prefecture near ore beds, but there have been objections on the ground that the ore available is limited in amount and not of the best quality. In the meantime the Mitsui, Mitsubishi, Sumitomo, and Furukawa interests have submitted a plan for a subsidy of Y.5,000,000 (approximately $2,500,000), to cover an annual production of 12,000 tons of aluminium by the end of five years. The present retrenchment policy of the Government is holding up this program, but the four companies are sufficiently strong to put it into effect when a change in the general situation makes it practical.

Another plan proposed was the erection of a plant at Tsurumi, to use power at a low rate from the Daido Electric Power Co. Ore probably would be obtained from France and America. The Korean Nitrogenous Co. also has offered a low rate on electric current from its plant on the Kosui River. Its proposal is for the erection of a plant to use ore from northern Chosen, to be reduced by the electrolytic method. A report after survey indicates that Chosen has a deposit sufficient to furnish ore for many years, with possibilities of further deposits.

The Sumitomo interests already are erecting a plant in Osaka for the manufacture of aluminium foil, and expect to start operations in July, 1931. They intend to supply the Far East, with the hope of replacing the present supply from Europe.

The Department of Commerce and Industry has been asked to give financial support to two new processes for treating an aluminium oxide, recently developed by nationals, one of whom is connected with the Physical and Chemical Institute of Tokyo.

The Japan Carbon Manufacturing Co. is making carbon anodes, for use in the electrolysis of aluminium ores, and claims efficiency in solutions up to 950° C.

A Japanese metallurgical engineer has developed a process for plating other metals on aluminium, recently announced and described.

The Touchstone of International Morality

The Nine Power Treaty; Who will Dare It?

There are excellent reasons why the Kellogg Pact does not apply to the Sino-Japanese dispute in Manchuria, but what about the Nine Power Treaty ? Why was it not invoked ? China declares that this treaty has also been violated and threatens to call an international conference under its provisions for a full and frank discussion between the Powers concerned. This treaty is China's Magna Charta, her ticket of admission into the family of nations on a plane of full equality and respect. This treaty recognized China's full sovereign rights and territorial integrity and automatically imposed upon her the duty of discharging faithfully the functions and obligations of a modern state. The Powers had faith in China and conceded to her the full and most unembarrassed opportunity to develop and maintain for herself an efficient and stable government. **Has this treaty been adhered to ?**

The outstanding points in the Nine Power Treaty are those in which the Powers agree to respect the sovereignty, the independence and the territorial and administrative integrity of China together with the provision that whenever a situation arises which, in the opinion of any of the signatory Powers, involves the application of the treaty and renders **desirable** discussion of such application, there shall be full and frank communication between the Contracting Powers concerned.

In connection with a recent report in the Chinese vernacular press that Dr. Wellington Koo, Acting Foreign Minister of the Nanking Government, referred to a possibility of an international conference being convened by virtue of Article VII of the Nine Power Treaty, a spokesman for the Japanese Legation in Shanghai gave out an interview outlining Japanese official opinion in regard to the treaty. Apart from the ambiguity of the clause which seems to leave it to the option of any one of the signatory Powers whether or not it is **desirable** to discuss the methods of applying the treaty, the Japanese viewpoint is opportune and interesting.

The Japanese spokesman emphasizes that Japan has faithfully abided by the letter and spirit of the terms of the treaty and in dealing with the present situation in Manchuria, **his government has no intention of breaking it's commitments under the treaty.** He then invites attention to the act that China also signed the treaty and proceeds to point out her inability and unwillingness to comply with its provisions.

Article I, provides that the Contracting Powers, **other than China,** agree to respect the sovereignty, the independence and the territorial and administrative integrity of China and in Article II, the Contracting Powers, **including China, " agree not to enter into any treaty, agreement, arrangement or understanding, either with one another, individually or collectively, with any Power or Powers which would infringe or impair the principles stated in Article I."**

The Japanese spokesman then points to the actual state of affairs in Outer Mongolia as to whether China herself has the intention and ability to uphold her sovereignty and territorial and administrative integrity, which the Contracting Powers, other than China, agreed to respect. He diplomatically leaves it at that

The statement is worth analyzing. Although the Japanese spokesman did not stress the importance of Article VII in connection with Outer Mongolia, the question might well be raised as to why China has not appealed to the other Eight Signatory Powers for a full and frank discussion as to how her territorial and administrative integrity in Mongolia can be restored. Article VIII stipulates that :

" Powers not signatory to the treaty, which have governments recognized by the Signatory Powers and which have treaty relations with China, shall be invited to adhere to the Nine Power Treaty. To this end the Government of the United States will make the necessary communications to non-signatory powers and will inform the Contracting Powers of the replies received."

It would appear from this clause that the United States becomes the guardian of the treaty, yet at the very outset its hands were tied and the clause nullified because it had no treaty relations with Russia or any means of communicating with her officially and solidifying adhesion to the pact. The question springs to the mind of the wondering American as to why his Government assumed the sole responsibility of communicating with the non-signatory Powers ? Why should the United States be placed in a position where it obviously could not carry out its

The Nine Power Treaty

Article I.—The Contracting Powers, other than China, agree :

(1) To respect the sovereignty, the independence, and the territorial and administrative integrity of China.

(2) To provide the fullest and most unembarrassed opportunity to China to develop and maintain for herself an effective and stable government.

(3) To use their influence for the purpose of effectually establishing and maintaining the principle of equal opportunity for the commerce and industry of all nations throughout the territory of China.

(4) To refrain from taking advantage of conditions in China in order to seek special rights or privileges which would abridge the rights of subjects or citizens of friendly States, and from countenancing action inimical to the security of such States.

Article II.—The Contracting Powers agree not to enter into any treaty, agreement, arrangement, or understanding, either with one another, or, individually or collectively, with any Power or Powers, which would infringe or impair the principles stated in Article I.

Article III.—With a view to applying more effectually the principles of the Open Door or equality of opportunity in China for the trade and industry of all nations, the Contracting Powers, other than China, agree that they will not seek, nor support their respective nationals in seeking—

(*a*) any arrangement which might purport to establish in favor of their interests any general superiority of rights with respect to commercial or economic development in any designated region of China.

(*b*) any such monopoly or preference as would deprive the nationals of any other Power of the right of undertaking any legitimate trade or industry in China or of participating with the Chinese Government, or with any local authority, in any category of public enterprise, or which by reason of its scope, duration or geographical extent is calculated to frustrate the practical application of the principle of equal opportunity.

It is understood that the foregoing stipulations of this Article are not to be so construed as to prohibit the acquisition of such properties or rights as may be necessary to the conduct of a particular commercial, industrial, or financial undertaking or to the encouragement of invention and research.

China undertakes to be guided by the principles stated in the foregoing stipulations of this Article in dealing with applications for economic rights and privileges from Governments and nationals of all foreign countries, whether parties to the present Treaty or not.

Article IV.—The Contracting Powers agree not to support any agreements by their respective nationals with each other designed to create Spheres of Influence or to provide for the enjoyment of mutually exclusive opportunities in designated parts of Chinese territory.

Article V.—China agrees that, throughout the whole of the railways in China, she will not exercise or permit unfair discrimination of any kind. In particular there shall be no discrimination whatever, direct or indirect, in respect of charges or of facilities on the ground of the nationality of passengers or the countries from which or to which they are proceeding, or the origin or ownership of goods or the country from which or to which they are consigned, or the nationality or ownership of the ship or other means of conveying such passengers or goods before or after their transport on the Chinese Railways.

The Contracting Powers, other than China, assume a corresponding obligation in respect of any of the aforesaid railways over which they or their nationals are in a position to exercise any control in virtue of any concession, special agreement or otherwise.

Article VI.—The Contracting Powers, other than China, agree fully to respect China's rights as a neutral in time of war to which China is not a party ; and China declares that when she is a neutral she will observe the obligations of neutrality.

Article VII.—The Contracting Powers agree that, whenever a situation arises which in the opinion of any one of them involves the application of the stipulations of the present Treaty, and renders desirable discussion of such application, there shall be full and frank communication between the Contracting Powers concerned.

Article VIII.—Powers not signatory to the present Treaty, which have Governments recognized by the Signatory Powers and which have treaty relations with China, shall be invited to adhere to the present Treaty. To this end the Government of the United States will make the necessary communications to nonsignatory Powers and will inform the Contracting Powers of the replies received. Adherence by any power shall become effective on receipt of notice thereof by the Government of the United States.

Article IX.—The present Treaty shall be ratified by the Contracting Powers in accordance with their respective constitutional methods and shall take effect on the date of the deposit of all the ratifications, which shall take place at Washington as soon as possible. The Government of the United States will transmit to the other Contracting Powers a certified copy of the process-verbal of the deposit of ratifications.

The present Treaty, of which the French and English texts are both authentic, shall remain deposited in the archives of the Government of the United States, and duly certified copies thereof shall be transmitted by that Government to the other Contracting Powers.

In faith whereof the above-named Plenipotentiaries have signed the present Treaty.

Done at the city of Washington the Sixth Day of February One Thousand Nine Hundred and Twenty-two.

commitments without inviting a stinging Soviet rebuff? Why is the United States always the catspaw in these highly explosive international disputes? If (as was plain when the treaty was signed) the United States could not with dignity extend the necessary invitation to Moscow, why did not some other signatory power which recognized the Soviet, then or afterwards, perform this delicate task? This failure to invite Russia to adhere to the terms of the Nine Power Treaty and the quasi-recognition of her independence in dealing with China, while binding Japan scrupulously to adhere to its provisions, is a glaring example of diplomatic inconsistency where Japan's vital interests are concerned, once more placing her in a position where her hands were tied in defending herself while providing Russia with the most free and unembarrassed opportunity to advance her own policies without protest or hindrance.

For several years, China maintained intimate treaty relations with Russia. The outside world will never know the inside facts surrounding the original understanding between the Kuomintang, the Soviet and the Third Internationale. We know something of the outward manifestations of the bargain and what it has done to China. That is all. But it is enough. Let us go back to Article II. **"The Contracting Powers agree not to enter into any treaty with any Power that infringes or impairs the principles stated in Article I."** This means that every Power, including China, that has entered into treaty relations with Soviet Russia has violated Article II. If this Nine Power Treaty is faithfully adhered to, China becomes the touchstone of international morality. No treaty with China signed subsequent to February 6, 1921, is valid or binding. China herself broke the treaty when she recognized and entered into relations with Russia. Every foreign power which has since recognized and entered into treaty relations with Moscow has violated the Nine Power Treaty. The treaty stands as an insurmountable barrier to any recognition of the Soviet by the American Government. The first condition of any renewal of relations between America and Russia must be a restoration of Mongolia to full Chinese authority.

It would be interesting to hear what Senator Borah has to say about this matter. He is a great stickler for the sanctity of treaties where Japan is concerned, but insists that the United States recognize Russia and at once. It would be illuminating to have his explanation of how he reconciles this attitude with Article II of the Nine Power Treaty without bringing upon the United States the stigma of violating its cardinal feature. It is all very well for Mr. Borah to denounce Japan for violating every international law in applying the right of self-defense, but it would seem that every signatory to the Nine Power Treaty also stands convicted as deliberate treaty violators, ignoring their solemn pledges in order to do a profitable business with Russia. A sweeping indictment, but one from which apparently there is no appeal under Article II of the Nine Power Treaty.

The only justification, and a slim one at that, for this general attitude of indifference to the sanctity of the Nine Power Treaty arises from the Chinese defense that the Mongols themselves declared their independence and the new state was immediately recognized by Moscow and incorporated into the system of Soviet republics. The explanation may pass, as America's acquisition of the Panama Canal Zone created this precedent for painlessly amputating a desirable and coveted piece of territory from an unwilling state. It is difficult for the United States to condemn Russia for applying the anesthetic to China. While other nations may have been disqualified from protesting against the rape of Mongolia, China, the interested party, could and should have vociferously yelled for help against being subjected to this outrage. That China now recognizes the legality of this method of circumventing the Nine Power Treaty and is guarding herself against any further major surgical operation, is sensed in the Eighth Reservation presented by Dr. Alfred Sze at Paris in accepting for China the League's Resolution to settle the Manchurian dispute. **"China would regard any Japanese attempt to being about political complications affecting China's territorial and administrative integrity (such as the promoting of so-called independence movements and the using of disturbing elements for this purpose) as an obvious violation of the undertaking."**

The reservation would seem to recognize that if the people of Manchuria should invoke the right of self determination and proclaim their independence it might be difficult for the rest of China to object. Dr Sze's reservation would carry no weight if the people of Manchuria should, with or without Japanese instigation and pressure, assert their right as citizens of the Republic of China to a voice in their own affairs, and the reservation is obviously an attempt to hold Manchuria against the will of its people as the private preserve of a military autocrat recognized as the Co-Ruler of China. **And that is the real issue in Manchuria.** For her own protection, Japan is apparently determined that the people of Manchuria shall be freed from their slavery and given a chance to establish a government of, by and for themselves.

If the rest of China is willing to submit to the yoke of their military taskmasters, it is their own concern, but the people of Manchuria are to have a government that will guarantee their rights and liberties as human beings, provide protection for their lives and properties and assure the impartial administration of justice. The creation of this new state is proceeding apace and as long as the armies of Chang Hsueh-liang are kept within the Wall, nothing can stop this new development in the political outlook of a hitherto oppressed people. Japan has assured the other Powers that she intends to abide by the treaties and respect the sovereignty, the independence and the territorial and administrative independence of China, but is determined that Manchuria is to have its own responsible government functioning efficiently before it is turned over anew to a central authority which delegated its rule to a group of bandit-generals it was powerless to subdue. This may be a violation of the treaties, but if we admit that the American Monroe Doctrine is the expression of our right to self-defense, justifying even our intervention in the affairs of Latin American republics in order to establish responsible governments, then Japan has the same right under her own doctrine of selfdefense to create a responsible government in her particular sphere of national security. The rule must work both ways to be fair.

Had President Chiang Kai-shek, the titular head of the recognized Government of the Republic of China, flown in his plane to Mukden immediately after the events of September 18, and announced on his arrival that he was there to take over control and reorganize the government, the whole world would have applauded and supported him. But the President of the Republic of China owes his title to an alliance with the military overlord of Manchuria and could not violate his agreement by interfering in the latter's affairs. If there is any explanation of Chiang Kai-shek's prolonged delay in proceeding to the north after repeated announcements of his readiness to lead the armies of China in a war against Japan, it is to be found, not in any absence of personal courage, but in the fact that by so doing he would have to throw overboard his co-ruler. President Chiang is in the same embarrassing position as Marshal Chang. It is not safe for him to travel outside his own jurisdiction without his army. Nanking's rule ends at the Yellow River. For Chiang Kai-shek to proceed to the north and leave his army behind in Nanking, would probably be as fatal to himself as the appearance of Marshal Chang in the streets of Mukden unaccompanied by his body-guard. Chiang Kai-shek is the victim of the system which elevated him to power. He cannot move freely within his own country without an army at his back. He pays the price that all tyrants have paid since the beginning of history.

If the Japanese will not permit Marshal Chang to return to Manchuria, they will not tolerate any move on the part of Generalissimo Chiang to re-establish his co-ruler's authority. Marshal Chang surrendered his right to rule when he refused to defend himself. Without the revenues he has squeezed from the people, he disappears from the picture. Manchuria is lost to Marshal Chang Hsueh-liang, but that does not mean that it is lost to China. Japan will live up to her treaties, which means that Manchuria will be united to the rest of China under a government whose efficiency and example must, in the end, influence every other section of China to throw off the shackles of slavery and enter into a new conception of nationhood under the principles laid down by Dr. Sun Yat-sen. What for the moment may appear to be a technical violation of China's sovereignty by Japan, may usher in a new and brighter era for the masses of this country. Patriotic Chinese may never forgive Japan for what she has done, but the price they are paying for unification, good-government and their freedom as human beings, is infinitessimal compared with the staggering penalty they would have to pay to accomplish the same ends by another long drawn out civil war. For the moment Japan is under a cloud, but it has a silver lining for the great masses of inarticulate China, the despairing slaves of a system their military rulers, their diplomats, their misguided students and mistaken propagandists would fasten upon them in the name of Democracy.

The bandit generals of China will make a desperate fight to preserve their rule; their spokesmen will loudly declare that the nation must arm and prepare to wage war against Japan. We heard the same slogans, the same arguments, the same emotional and hysterical denunciations, the same propaganda drivel during the World War. Ten years after, we are co-operating closely with Germany for the advancement of world peace and financial stability and we venture to prophecy that if wiser counsels prevail, within another five years when militarism in China is subordinated to the civil power and this menace to the well-being of the people of China and the peace of the Far East is eliminated, China and Japan will also be co-operating under a better understanding for the preservation of peace and mutual prosperity. It is either that, or China will go Red and become such a real danger to the rest of the world that all the Powers will have to unite to save civilization from ruin or stand aside and permit Japan a free hand to save herself from going under. Much therefore depends upon the outcome of the Manchurian dispute and the final solution of its political status. If Manchuria goes the way of Mongolia, converted into an independent state and amputated from the main body of China there is no hope for permanent peace. If, however, it is developed under a responsible and representative local government to take its proper place in a new confederation of autonomous Chinese states delegating their powers to a strong central civilian government, there is hope for the future. **Militarism in China must go.**

We have faith that Japan will live up to the basic principles of the Nine Power Treaty, and in her own good way and time once more demonstrate her real friendship with her racial brothers. The future of Japan is indissolubly linked with the future of China. If China goes under, Japan also faces extinction. If, as the Chinese loudly contend, Japan is seeking to conquer their country, the time will surely arrive if the present chaos continues and all government collapses, when the rest of the world will welcome any steps taken by Japan to safeguard their interests. The time will come when the Nine Power Treaty will have to be invoked to save China from herself. The Treaty was signed to enable China to set herself up as a modern state and assume the functions and duties that goes with it. Instead of progressing and carrying out her side of the agreement, China has gone from bad to worse, until she now faces extinction as a state. China herself has failed to comply with the treaty, violating every principle and commitment entered into. It may be necessary to call an international conference to discuss what is to be done, but instead of China invoking the provisions of the treaty against Japan, the call may come from some other interested Power in order to bring China before the bar of international justice.

* * *

Returning to the interview given out by the spokesman for the Japanese Legation he points out that Japan and the other Contracting Powers have faithfully complied with paragraph 2 of Article II of the Treaty. "Indeed," he says, "few instances can be found of such patient and sympathetic dealing in the history of international relations." Japan, above all, has done her utmost to uphold and advance the principles of the Washington Conference. At the Special Conference on Customs Tariffs held in Peking in 1925, Japan took the lead in the discussion of Chinese tariff autonomy and urged the other Powers to favorably consider the matter.

In Article V of the Treaty, China promised that she would not exercise or permit unfair discrimination throughout the whole of the railways in the country. The Chinese Government has violated this stipulation by applying highly discriminatory freight rates for foreign goods transported by the Shantung and other lines. These rates are still in force despite repeated protests of Japan and other Powers.

The Nine Power Treaty is inseparably related to the Resolutions of the Washington Conference. Resolution 4, regarding extraterritoriality in China, provides for the establishment of a Commission by the Powers concerned to enquire into the question of the abolition of extraterritoriality and the report of the Commission was submitted in 1926. The Recommendations contained in that report, to which the Chinese member of the Commission attached his signature, have not yet been all carried out by China, and apparently China has no intention of doing so. On the contrary, China has proceeded to unilateral abolition of extraterritoriality, before fulfilling her commitments to the Powers concerned.

In Resolution No. 5, the Powers agreed to abolish foreign postal agencies in China, one of the conditions being that China should maintain an efficient postal service of her own. Has China maintained such a service? "Even in ordinary times, when there was no particular trouble" says the Japanese spokesman, "the Chinese Post Offices often refused delivery of Japanese newspapers, while during times of severe anti-Japanese agitation, they intentionally delayed or obstructed the transmission of Japanese mail matter. Not only private but official Japanese diplomatic correspondence have been frequently tampered with. In some cases they were unlawfully opened and in others were expropriated without lawful cause, while postal marks containing anti-Japanese slogans were frequently used."

Resolution No. 6, regarding Armed Forces in China, while recognizing the presence of the armed forces of the Powers stationed in China for the protection of foreign lives and properties, declares the intention of the Powers to withdraw their armed forces as soon as practicable and places on record China's declaration of her intention and capacity to provide protection for the lives and properties of foreigners in China. Ten years have gone by and China has failed utterly to comply with this duty and the Powers have been compelled to increase their armed forces in Shanghai and other places in order to discharge a fundamental duty to their nationals that China is utterly incapable of performing.

Resolution No. 9, on the Reduction of the Chinese Military Forces, calling attention to the severe drain on the public revenues of China through the maintenance of excessive military forces by military chiefs in various parts of the country, states that the continued maintenance of these forces is mainly responsible for China's unsettled political conditions and expresses the hope that immediate and effective steps may be taken by the Chinese Government to reduce these military forces and expenditures. The Chinese Government signed this Resolution and is bound by its provisions, but has since shown neither the intention nor the capacity to carry it into effect. The military forces of China, regular and irregular, are to-day, estimated at double the strength at the time the Resolution was passed. The cost of maintaining these armies has brought China to the point where she faces a grave financial crisis, and collapse of government with her economic development halted and her foreign trade deplorably depressed.

In summing up his presentation of Japanese opinion on the Nine Power Treaty, the Japanese spokesman says:—

> "China, on her part, has proved impotent to utilize the excellent opportunity held out before her for these ten years since the Washington Conference. Her internal political situation has gone from bad to worse, and she is still unable to erect an effective and stable government. Her foreign policy has been characterized by disregard of law and ill will towards foreign Powers, as is shown by her repudiation of treaties and anti-foreign activities. All these facts prove that China has no intention or ability to respect the stipulations of the Nine Power Treaty. The treaty which has no fixed term of validity, was made in order to meet the special requirements of the time by giving expression to certain principles. Now that China has revealed her utter inability to respect and uphold the Treaty, its original significance towards China has been fundamentally altered.
>
> "The terms of the Treaty and the Resolutions of the Washington Conference must be interpreted and applied as a whole. All the efforts of the foreign Powers towards carrying into effect the provisions of the Nine Power Treaty and the Resolutions passed for the benefit of China have been wasted through lack of sincerity and ability on the part of China. For this reason, China has forfeited much of the applicability of the Treaty.
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> "China will not be permitted to single out a passage from the Treaty which she has set at naught and apply it to her own convenience. Neither can China be permitted to make use of an international document she has violated for the purpose of anti-Japanese propaganda."

A very forceful and convincing conclusion.

The Nine Power Treaty stands, but who will invoke it against Japan?

Japan's Economic Federation Issues Statement on Manchuria

(The Economic Federation of Japan embodies 30 leading banks. 180 companies engaged in economic activities, and has on its board of 20 directors presidents of the six leading chambers of commerce of the Empire. The total membership is over 700 persons, while the capital investment represented is Y.5,500,000,000. The President of the Board of Directors is Baron Takuma Dan. Mr. Seichi Takashima is the Executive Secretary, the offices being located in the Industrial Club Building, Marunouchi, Tokyo.—The Editor.)

Statement of the Japan Economic Federation on the situation of Manchuria and Mongolia cabled to :

Mr. Silas H. Strawn, President of the Chamber of Commerce of the United States of America, Washington.
Sir Arthur Balfour, Chairman of the British National Committee of the International Chamber of Commerce, London.
Mr. Franz von Mendelssohn, President of the International Chamber of Commerce, Paris.
Mr. Kenkichi Yoshizawa, Japanese Ambassador in Paris.
Mr. Katsuji Debuchi, Japanese Ambassador in Washington.
Mr. Shinjiro Matsuyama, Commercial Counsellor of Japanese Embassy, London. London Office, Japanese National Committee of the International Chamber of Commerce.
Mr. Yasuto Shudo, Commercial Secretary of Japanese Embassy, New York. New York Office, Japanese National Committee of the International Chamber of Commerce.

Indisputable is the right of Japan to insist upon China's observance of treaty engagements and particularly upon preservation of her rights and interests in Manchuria and Mongolia. So apparent is this that no comment should be needed. It is equally obvious that Japan and China should be united and loyal in the maintenance of peace in the Far East and in the promotion of their mutual interests and welfare. Japan has always held to this ideal and been confident her sincerity would be appreciated by China. To her deep regret, this confidence has been betrayed.

In contrast with Japan's persistent patience in dealing with China in every possible conciliatory manner, hoping she would realize and abandon her destructive policies, China's anti-Japanese campaign has been steadily increasing in scope and virulence in recent years, particularly in Manchuria.

To understand the present status of Japan in Manchuria, it is necessary to review her economic development of the past few years.

Baron Takuma Dan

In 1907, the first normal year after the Russo-Japanese war, the foreign trade totaled 52,727,475 Haikwan taels, and imports exceeded exports by 8,642,829 taels. Within three years, trade tripled, and the trade balance turned. The increase has been steady. The trade in 1929 reached Tls. 755,225,360 nearly 15 times greater than in 1907 ; exports exceeded imports by Tls. 96,047,622. Not since 1919 has the balance of trade been unfavorable. To take advantage of this prosperity, immigrants poured in from China proper, Korea and Japan. Of to-day's population, estimated at about 29,000,000, only a few more than 1,000,000 are Japanese nationals, including some 800,000 Koreans. It is the Chinese who have benefited most by Japan's constructive labors in Manchuria. Japan's investments of Y.2,000,000,000 have created the commercial and industrial machinery which enables the population, predominantly Chinese, to make good use of land and energy.

This development, it is important to remember, has encountered handicaps unknown in other frontier regions in modern times, China itself has not flourished. Where civil war is frequent, where war lords maintain poorly disciplined armies with wealth wrested from the people, where no improvements prevent floods, famines and epidemics, development is impossible. Japan was for a time able to minimize handicaps of this nature in Manchuria because of one fortunate privilege, that of maintaining armed guards along the railway zone. These guards were needed when the treaty which sanctioned them was signed in 1905. The need has never ceased. As Manchuria gained wealth, the Chinese war lords gouged more and more of it from the people, lavishing it on themselves and on armies numerically larger than the region needed or could afford. Normal taxes would have yielded abundant revenue for such social essentials as good government, schools and highways. Instead, there was appalling waste, always leading to more impoverishing extortion of money from the people by devious methods. As though to kill the goose that laid the golden egg, envy centered on Japan's investments. These were legitimate investments, based on treaties. China not only consistently refused to recognize the validity of the treaties, but persistently ignored the hundreds of protests officially lodged by the Japanese Government. The attacks were amplified into attempts to injure and even ruin the Japanese vested rights by forceful interference with the railway, with other Japanese concerns and even with peaceful Japanese residents. The movement became a national phobia, spreading to all parts of China and finding an ally in the unwarranted belief that foreigners, especially Japanese, are exploiting and persecuting the Chinese. To stimulate this propaganda even the text books in Chinese schools were mobilized. China's oppressive policy towards Japanese within her border particularly made manifest in recent years in the boycotting and confiscation of Japanese goods under the instigation of national leaders, in unjust taxation, in illegal arrests and in slights and insults of various descriptions. Often, the Japanese are even prevented from obtaining the daily necessities ot life. Such persecution is indeed of a nature warranted at best only in time of war.

The railway guards in Manchuria no longer protected Japanese lives and interests solely by their presence. Japan's conciliatory policy and patience and diplomatic quest for a remedy seemed futile. China's disease of unlawfulness and violence grew worse and was taking advantage as she usually resort to against a party whom she considers impotent to take a decisive action. Because Japan's interests in Manchuria had become vital to her own economic existence, it was out of the question to relinquish them and withdraw. The only alternative was to openly defend her rights.

Japan's sole desire in Manchuria is to create the peaceful conditions needed to assure the prosperity of her interests and the existence of a sane and healthy neighbor able to co-operate toward the ideal of world welfare. In doing this, she sees nothing wrong. Rather, there has been disappointment here that the world has not fully understood the situation and has not given moral support.

It is to be sincerely hoped that circumstances will permit military operations to be confined within the smallest possible limits, so that a fair and equitable settlement may be brought about through direct negotiations between Japan and China at an early moment. Such a settlement, however, will be possible only when there have emerged conditions ensuring the security of Japan's rights and interests in Manchuria and Mongolia, and, above all, when, China's leaders have abandoned their misconceptions of Japan's motives and their present mistaken policies.

(Signed) Baron Takuma Dan,
President, Japan Economic Federation.

The Right of Self-Defense

Why the Kellogg Pact Does Not Apply in the Manchurian Dispute

It now appears that American co-operation with the League of Nations was inspired by a desire to give force to the Pact of Paris. Secretary Stimson's instructions to Mr. Prentiss Gilbert authorized him to participate in the discussions of the Council only when they related to the possible application of the Kellogg-Briand Pact and in any other discussion of the Sino-Japanese dispute he would sit in merely as an observer and auditor. These instructions, subsequently superseded by the appearance of Ambassador Dawes at the Paris meeting of the League Council as an unofficial outside observer, cancels the original blanket order promising that the United States would reinforce any decision of the League as to Manchuria and brings us back to solid ground, facing the realities.

But why all this hysteria over the Kellogg Pact? Why should America have to join up with the League in order to invite the attention of China and Japan to its provisions. There is nothing in the treaty which calls for such interference. It is simply a Gentlemen's Agreement to solve their disputes by pacific means. The very essence of the Pact is the right of self-defense. In explaining the treaty to the Senate Committee on Foreign Relations, Mr. Kellogg declared **"that the right of self-defense was not limited to the defense of territory under the sovereignty of the state concerned, and that, under the treaty, each state would have the prerogative—or the responsibility—of judging for itself what action the right of self-defense covered and when it came into play, subject to the risk that this judgment might not be endorsed by the rest of the world."**

In the above statement, Mr. Kellogg adhered to the same definition of the principle of self-defense as was laid down by Mr. Charles Cheney Hyde in his work on international law and by Mr. Elihu Root in an exposition of the principle as applied to the Monroe Doctrine. **"It is well understood that the exercise of the right of self-protection may, and frequently does, extend in its effect beyond the limits of the territorial jurisdiction of the state exercising it. The strongest example probably would be the mobilization of an army by another power immediately across the frontier. Every act done by the other power may be within it's own territory. Yet the country threatened by this state of affairs is justified by protecting itself by immediate war."** The Monroe Doctrine, as Mr. Hughes interprets it, **"rests upon the right of every sovereign state to protect itself by preventing a condition of affairs in which it will be too late to protect itself."**

It is necessary to emphasize these definitions of the Monroe Doctrine, as the doctrine itself is textually recognized in the Covenant of the League of Nations and **sub-silencio** in the Kellogg Pact. Explaining the absence from the treaty of any specific mention of the Monroe Doctrine, Mr. Kellogg said that to mention it specifically would have been superfluous, since the Monroe Doctrine itself was based specifically and exclusively upon the right of self-defense. On the question of the "British Monroe Doctrine," reserving the right of the British Government to defend its interests in "certain regions," Mr. Kellogg explained that this was also based on the right of self-defense. On the question of whether there was any obligation, legal or moral, upon the United States to go to war with a state that violated the treaty, Mr. Kellogg's answer was an emphatic negative. The Senate Committee of Foreign Relations recognized the above essential features as a true interpretation of the treaty and incorporated them in a final resolution before reporting favorably on it's adoption.

The treaty does not expressly or implicitly contemplate the use of force or coercive measures for its enforcement as against any nation violating it. Each nation must be it's own judge in resorting to self-defense and it is answerable solely to the public opinion of the world if it is not an honest defense. In resorting to force in Manchuria, not by an aggressive invasion from without, but by employing police troops stationed in that territory under the terms of treaties with China, Japan has invoked the right of self-defense. Before she can be condemned by world opinion, the causes she holds as justifying her action must be impartially considered. Justice to China is possible only by conceding justice to Japan and although practically every official statement issued by either government is immediately denied by the other, there is sufficient corroborative evidence upon which the public can form a fairly accurate opinion as to the causes which led up to the present issue.

For years, China has spurned any settlement of her outstanding disputes with Japan through direct negotiations. Her fixed policy has been to drag Japan before an international court for the settlement of the Manchurian dispute. Unsuccessful in 1919 at the Paris Conference and in 1921 at the Washington Conference in winning her case against Japan, China reserved the right to reopen the question on every appropriate occasion. What she could not accomplish by international intervention or by resorting to open hostilities, China has endeavored to attain through boycotts, economic warfare, evasion of treaties, repudiation of contracts, defaulting on loans, confiscatory taxation, persecution of Koreans and other acts of legalized pacific warfare. Once open war is abolished as an instrument of national policy, flouting of treaties and other obligations carries no penalties to the offender.

China has repeatedly declared that she would never recognize the 1915 treaty on which Japan's position and rights in Manchuria are based. She has a strong moral case, that commands respect and if considered strictly on its merits and without reference to what had gone before, China could rely on an unqualified world sympathy. For the past year, Japan has been trying to negotiate a new treaty of commerce and friendship with China, being willing to sacrifice all her special interests, rights, concessions and extraterritorial privileges in China Proper on the condition that her subjects be conceded most favored nation benefits, but China refuses to discuss the matter unless and until Japan surrenders the Liaotung Lease and withdraws her troops from Manchuria. The whole basis of Japan's position as a great Power, her very existence as a nation was at stake. Both nations were facing a situation that could be solved only by a resort to arms. The whole world knows, or should know, that Japan will never discuss her rights and interests in Manchuria with any third power. It is impossible for Japan to even admit that the 1915 treaty is open to discussion without creating the precedent for reopening other important international agreements affecting the peace of the world. Naturally, China is anxious to throw her case into the World Court. She has everything to gain and nothing to lose. Whether recognized by other nations or not, Japan has applied her own Monroe Doctrine in the one region she considers vital to her economic life and strategic security. In the same way that the Monroe Doctrine is recognized as a matter of course in the Kellogg Pact (and in the League Covenant) as vital to America's self-defense, or as the more general and less explicit British "Monroe Doctrine" is admitted without discussion, so Japan rightfully considers that her interests in Manchuria do not require specific mention in any international agreement for the preservation of world peace.

Who is to be the judge of Japan's right to apply the law of self-defense? Clearly neither the United States nor Great Britain is in a position to question or challenge a principle they maintain as the basis of their own national security. So long as war is not declared and Japan is entitled under the Kellogg Pact to be her own judge of what constitutes self-defense, no other nation can impugn her motives without precipitating a still graver crisis. Only by a full understanding of both sides of the case and a knowledge of all that has gone before can any impartial verdict be arrived at.

It is unfair to pick out any one incident to prove that Japan intentionally precipitated the issue. It is just as easy for an intelligent observer to prove that China was spoiling for a fight with Japan and seeking any excuse to open hostilities. It is only necessary to recall that in January of this year, Dr. C. T. Wang, was reported to have declared to his fellow-provincials in Chekiang that China would fight Japan over Manchuria and in August he again referred to the necessity of using force in the settlement of the Manchurian problem. It must not be overlooked that the success of Dr. Wang's whole program of treaty denunciation, abolition of extraterritoriality, surrender of concessions, withdrawal of foreign troops and warships, and the full assertion of Chinese jurisdiction over foreigners on January 1, 1932, depended upon the outcome of his treaty negotiations with Japan. Unless Japan consented to surrender her legal position and extraterritorial rights in Manchuria, the Nationalist program would fail. Unless Japan could be coerced into surrendering her rights in Manchuria, no new treaty of commerce and amity between the two countries was possible, and with the New Year only three months' away, Dr. Wang faced certain defeat. The British Government was slipping, ready to throw overboard its nationals and trade in China while Washington showed no signs of firmness on the question of extraterritoriality. Japan alone stiffened her backbone and faced the realities. In defending her own interests, Japan assumed the burden of the fight against extraterritoriality for all other foreign interests in China.

Dr. Wang's firm insistence upon the surrender of the Liaotung Lease as the basis of any new treaty between the two countries, reflected the unalterable and determined program of the Nationalist Government based on the possession of huge and well equipped armies deluded into a belief of their invincibility. Nanking's Foreign Minister was merely the mouthpiece for his military superior, who, surrounded by some hundred and fifty European military experts, advisers and instructors, commands a mighty army of nearly a million men, veterans of three victorious domestic wars. Chiang Kai-shek is fully justified in considering himself as the outstanding military figure in the world of to-day. His armies are trained fighters, with abundant experience in actual modern warfare. Since the Great War, no other armies have fought on such a grand scale. They believe they can "lick the world" and hold the Japanese in contempt.

Several times during the past year, the newspapers of China have chronicled the warlike utterances of Generalissimo Chiang Kai-shek. In July, the Canton group gave out for publication that Chiang proposed unification on the basis of making war upon Japan. Nor was this feeling of military superiority confined to disdain for the Japanese. It found expression against all foreigners. There is no other interpretation to Dr. C. T. Wang's repeated threats of what would happen unless extraterritoriality was immediately abolished. China's officials have been employing threats for the past few years to intimidate foreign governments into accepting her viewpoint. It is superfluous to cite instances.

The diplomatic weakness of the Powers in dealing with China; a reluctance to use force even to protect the lives and properties of their nationals; the continued recognition of a succession of bandit régimes as the Government of the Republic of China, and a refusal to admit the realities of the situation, have contributed to creating in the minds of the Chinese a feeling of superior diplomatic and fighting qualities. Human nature is the same in China as elsewhere. If the position and prestige of other nations in world affairs is determined by the size of their sea and land forces, China has a perfect right to consider herself as a great military power, possessing armies that equal numerically all the other armed forces of the world. These armies, in the main, are well trained by participation in actual warfare, equipped with heavy and light artillery, machine-guns, tanks, aeroplanes, motor transport and all the other paraphernalia of wholesale slaughter. It is asinine to assume that these armies will not fight. Man for man, in the raw material, the Chinese soldier is equal to any other human being. Regularly paid, properly led and inspired with an ideal or a purpose, the Chinese soldier will fight as bravely as any other. It is the height of unwisdom to hold these armies in derision. They must be reckoned with.

For the past ten years, the Signatories to the Nine Power Treaty have made no move to enforce respect for that treaty by reminding China of her obligation to reduce her armies and have watched with unconcern their expansion to double their strength at the time the treaty was signed. They have seen one disastrous war after another deluge China with blood. Millions of poor, defenseless, despairing people have been butchered, starved, outraged and enslaved because no Signatory to the Nine Power Treaty had the courage to demand compliance with the Resolution of January 20, 1921. Militarism in China has grown in the past ten years to the point where four hundred or more million people have become the slaves of a system that is a disgrace to Civilization, an indictment of every Power that has profited from the blood of these helpless victims of man's rapacity.

Every nation that has supplied arms or the machinery to manufacture arms to China, whether it be to the recognized government or to any of the warring factional leaders, is responsible for perpetrating this appalling crime against humanity. It is the rankest hypocrisy to furnish those war-lords with the implements of death that have enabled them to rivet the yoke of slavery upon a helpless people and then condemn Japan for using the same implements to liberate them. It is contemptible to arraign Japan for using aeroplanes to bomb the Manchurian town of Chinchow and applaud when a Chinese war-lord uses the same instruments of destruction upon his own unfortified cities and people. It is base, wicked and despicable to close our eyes to the heinousness of a crime against a defenseless Chinese city when the pilot of the plane is a hired foreign killer teaching the Chinese up-to-date methods of wholesale slaughter and a few months later cry out to Heaven against the Japanese military air-corps for bombing the headquarters of a Chinese army. It is pure bunkum to denounce Japan's militarists when the horrors of the last ten years of civil warfare in China stagger humanity. This **pacific** nation has now enrolled in its armies nearly three million men, with another two million bandits and communists preying off the country. Militarism has run mad in China.

When President Hoover announced the call for a disarmament conference to limit the size of the world's land forces, Generalissimo Chiang Kai-shek declared that the National Government of China intends to still further increase it's already swollen armies! These Chinese armies have destroyed their own country, eaten up it's sustenance, bankrupted its treasury, impoverished and enslaved the people and become a menace to world peace. These armies may mean nothing to Europe and America but they constitute a standing challenge to China's immediate neighbors. When the leaders of these armies and their diplomatic spokesmen bravely announce that Japan must be driven out of Manchuria and incident after incident occurs to indicate even to the disinterested spectator, that a definite program is being followed to undermine and destory Japan's rights; when a similar offensive is being waged against all other foreign interests and the Powers make no move to enforce respect for the treaties; when it became increasingly evident that international co-operation for the protection of foreign lives and properties is no longer possible in China; when Great Britain and the United States were ready to surrender to the demands of the Chinese war-lords; who could Japan appeal to or consult with any hope of being supported? What Signatory to the Kellogg Pact would have stood with Japan in demanding that China live up to her treaty obligations? What good would it have done Japan to invoke the Nine Power Treaty, when for ten years, China has refused to comply with her end of the bargain? There had to come a time when some incident would compel Japan to act in self-defense.

That incident happened, and immediately Japan was accused of manufacturing a pretext for what followed. For the sake of argument this can be admitted, but the case could be as conclusively presented that China was all set for war and looking for trouble. Our information is that the Chinese general who arrested and murdered Captain Nakamura and his party openly boasted in Harbin how he did it and carefully destroyed the bodies. When asked if he had buried the horses, he realized that he had overlooked the evidence that would lead to the discovery of the crime and the identity of the victims. A careless oversight. The Japanese Government should have protested to Nanking and awaited a year or so for an answer and satisfaction. But we have to take into consideration the reaction of the Japanese army officers on the ground who had precise information of what was going on in Manchuria.

The Chinese army, secure in its overwhelming numerical strength, was constantly boasting about its prowess in battle, referring contemptuously to the Japanese "dwarfs" as soldiers without experience of actual warfare. The conciliatory policy of the Tokyo government and its rigid adherance to the treaties was accepted in the only way the Asiatic reacts to such conduct. It simply stiffened the determination of the Chinese to drive the Japanese out of Manchuria. The list of incidents which make up the case is too long to detail in this article. The situation became intolerable. In Tokyo, Baron Shidehara, adhering scrupulously to the rules of the new international code of morals, was quietly preparing a case for presentation to the world that would have commanded immediate attention and respect. The Chinese were also preparing their case for presentation to the League. **They both waited too long.** Events marched too rapidly in Manchuria. The anti-Japanese attitude turned into one of open defiance with repeated talk of the immediate expulsion of the Japanese and the approach of hostilities. The situation was loaded with dynamite as far back as last June and July. It only required some damphool to throw a match into the magazine. The outside world, concerned with it's own problems paid no heed to the danger signals. The Chinese were preparing for their annual major civil war with the armies of Nanking and Canton mobilizing for the fray along the Kwantung border. If other nations manifested any interest at all in what was happening in China, it was merely with the hope of selling war munitions, or other implements of death.

There was a limit to the patience of the Japanese army on the ground. No self-respecting fighting force would have suffered these indignities without hitting back. It goes without saying that a small force of ten thousand men guarding the South Manchuria Railway and the Liaotung Leased Territory, surrounded by a Chinese army of 350,000, would have every move planned in advance in case of an emergency. So, notwithstanding the Japanese official explanation, it may be that the incident of September 18 was prepared in advance in order to justify what followed. If we admit the Chinese contention, the incident stands as the most reckless, hair-brained exploit in military history. The evidence is now conclusive that not more than 650 Japanese troops were engaged in attacking the premier military stronghold in China, capturing it within twenty-four hours. It is contrary to all the appearances for the Chinese to declare it was a put up job and that instructions had been issued by Marshal Chang Hsueh-liang for the Manchurian armies to lay down their arms in the event of being attacked. The story fails to square with previous official statements and the general attitude of the Chinese towards Japan. It is incredible that the commander of an army of 350,000 men would issue orders to lay down arms and hand over his capital, his arsenal, his treasury, his aerodrome and everything which represented his right to rule, without putting up some kind of resistance. Had the 14,000 hardened veterans of the Mukden garrison reacted as any other seasoned army would have done under similar circumstances and defended themselves against the sudden attack of a few companies of inexperienced Japanese railway guards, they would easily have destroyed the aggressors before reinforcements could have been rushed from Korea and justified their action under the law of self-defense. If, as the Chinese contend, the explosion on the railway was a put up job, and could prove it, and had defended themselves, they would have had a case that would have aligned world opinion solidly with them and justified any sanctions the League might have imposed upon Japan to prevent further hostilities. China would have commanded respect and admiration for her prompt application of the fundamental principle of all peace pacts. As it is, she now stands exposed to the charge that while reserving to herself the right to maintain the largest army in the world and to wage continual warfare within her own country, she expects, nay demands, that the armies of the League and the whole machinery of diplomatic and economic warfare be employed to defend her at any time her own forces provoke a conflict with an outside Power. If China expects the rest of the world to do her fighting, she should first disband her armies and place herself unqualifiedly under the protection of the League. Then, and only then, would the rest of the world be willing to champion her cause and guarantee her against all aggression from the outside. As long as China persists in being the greatest military power in the world and talks of increasing her already stupendous armies, she must guarantee her own security and fight her own battles. China's appeal to the League, the Kellogg Pact and the Nine Power Treaty for protection when she refuses to apply her fundamental right of self-defense, is not calculated to elevate her in the estimation of those who she expects to fight her battles for her.

If, on the other hand, the Chinese were seeking an opportunity to create an incident that would once more hale Japan before an international tribunal they went the right way about it. The League was about to meet in Geneva. The Chinese knew that a conference was to be held in Tokyo in October to determine the policy to be pursued in Manchuria. They knew that Japan had a strong legal case that she would never submit to arbitration. The only way to compel Japan to submit the 1915 treaty to arbitration was to create a situation wherein Japan could be once more brought to the bar of international justice on some other count. The Chinese knew that they could never bring the "unequal treaties" or the 1915 Treaty directly before the League on their merits. They knew that revision of treaties extracted under duress was a sore spot in European politics and that the League would never create a precedent that would sign its own death warrant. Only by creating an incident that came within the scope of the League's other activities, could China get her case before the world. This was China's one hope to escape facing Japan alone over the validity of the 1915 Treaty and making good on New Year's Day. Chinese soldiers on the night of September 18, destroyed the South Manchuria Railway track near Mukden and opened fire on the Japanese railway patrol. Synchronizing with the opening session of the League Council, this incident would have provided the opportunity of bringing Manchuria forcibly to the attention of the League. The only mistake was in the day and hour and in under-estimating the efficiency of the Japanese military machine. The outside world may entertain a reasonable doubt as to the accuracy of the Japanese military explanation of how the incident started, but it cannot altogether ignore the evidence. If the Japanese prearranged the incident, it was a foolhardy enterprise, inviting disaster. Under the circumstances, the Japanese dared not assume that the Chinese would not fight. If, on the other hand, the Chinese did wantonly blow up the railway track to create an incident in order to throw the Manchurian issue into the League, they never anticipated that the Japanese troops would leave the railway zone and attack the barracks or city. The Japanese had stood for so many indignities at the hands of the Chinese, that the latter felt certain they would never strike back. From Friday night to Monday morning, over the week-end, when the League Council was not in session, the 10,400 Japanese railway troops occupied every strategic center in South Manchuria. The Manchurian veterans refused to fight and China threw herself hysterically into the arms of the League screaming for protection.

We do not assert that the above is an exact version of the incident, but we do insist that in the absence of a final verdict it is just as plausible and credible as the rapid fire explanation broadcasted to the world immediately afterward by the Chinese. If we are looking for motives, China had everything to gain by precipitating an incident. Japan had everything to lose. The Japanese forces on the ground had no time to request Tokyo for instructions. They had no option but to follow the plans already laid down for such an emergency. They acted in self-defense and in invading Chinese territory to such points as were essential for self-protection, adhered to the basic law of military tactics which counsels swift action on the part of a small force operating against overwhelming superior numbers. The Japanese had to forestall any possibility of being attacked by forces at the time outnumbering them at least thirty-three to one.

Japan is now charged with breaking the treaties by resorting to war as an instrument of national policy. The fact that in self-defense they were compelled to break their treaties with the other Powers in order to enforce respect for the treaties by China, does not seem to weigh in formulating public opinion concerned solely with a strict textual interpretation of the Kellogg Pact.

Had Japan willfully premeditated an aggression on China's sovereignty and stood ready to suffer the consequences of violating her treaties with other Powers, she would never have gone about it in such a half-hearted way. She would never have courted defeat, derision and the loss of self and world respect at the very outset by entrusting such a momentous adventure to a mere handful of railway guards overwhelmingly outnumbered in a territory guarded at the time by over 360,000 seasoned troops, the flower of China's fighting forces. Any calm and reasoned analysis of the situation or a clearer understanding of Japan's high conception of honor and international morality will absolve her of the hysterical charges levelled against her by China and her emotional friends. If Japan had made up her mind to defy world opinion, Manchuria would long ago have been occupied in force by the regular Japanese army. That at no time since the night of September 18, has her railway guards been in excess of the number allowed by treaty is sufficient evidence of her honorable intentions.

For Japan to defend herself against China is an intolerable presumption, a gross violation of the League Covenant, the Four and the Nine Power Treaties, the Kellogg Pact, the Open Door and the Monroe Doctrine of Russia.

Both the American and British Governments for the defense of their own special rights and interests have driven a hole through the Kellogg Pact (and through Articles XI and XII of the League Covenant as well) and unless other nations similarly placed, enjoy the same right to exercise freedom of action which have "a special and vital interest for their peace and safety," the mere mention of invoking the Pact against Japan is opposed to the very principles of right and justice upon which the Pact is supposedly based.

The Kellogg Pact is simply one additional step forward towards the goal of universal peace, but only a step and a halting one at that. Universal peace, the relinquishment of the right of self-defense and private warfare can be attained only after all rights of sovereignty on the part of individual nations are merged into a new international order, by the creation of the Super-State. No peace pact that outlaws war between two nations and tolerates domestic warfare on a grand scale and to the point where a neighboring state must resort to force to protect itself, will solve the great problem of universal peace.

Under such circumstances, Mr. Kellogg could not define the right of self-defense ; he could not deny to a state the inherent right of the individual to defend himself against violence in the absence of the police. The law of "justifiable homicide" where the individual kills in self-defense, must be extended to a state exposed to violence and attack by the acts of another lawless state over which the police force of the world has no jurisdiction and which refuses to permit any outside intervention in its affairs.

"A nation claiming to act in self-defense must justify itself before the bar of world opinion." That is all there is to the Kellogg Pact, when, and if broken. It means nothing at all, for the very simple reason that it is impossible to get all the facts of any case clearly before the world without the essentials of either side being lost in a fog of propaganda. Until the right of defining self-defense is denied to individual nations and some other means of preventing or outlawing war is devised by merging sovereign rights in a League of Nations, incidents like the one which precipitated the issue in Manchuria will continue to arise to try the patience of the world.

Confining our argument to the Far East, these causes which make for war are not exclusively to be found in Manchuria. Had we the time and space we could present a long list of other incidents in China where the deliberate firing of a shot or even a stray bullet under certain conditions would have plunged the world in another war. On several occasions during the past few years right here in Shanghai, the issue has been squarely planted by the conflict over Settlement boundaries and jurisdiction, with the Chinese armed forces facing the Settlement guards across opposites of a road and lined up with machine-guns and rifles pointed at each other ready to fire. Any relaxation of control, the firing of one shot, on any one of these occasions would have created an incident that would have brought the war-fleets of the Powers steaming at fullspeed to the port for its protection. A continual state of warfare has existed on the Yangtsze River for years. Only the greatest self-control under the most severe provocation has prevented open hostilities. Some day, however, if it is allowed to continue, an Admiral of the Yangtsze Patrol or a Minister Plenipotentiary of some power making his inspection trip, will be potted by these Chinese armies and the fat will be in the fire. Or, we may have another Nanking outrage, where foreigners are being massacred and their women raped under the eyes of foreign gunboats whose commanders must refrain from discharging their duty for fear of a reprimand. **"Here goes for a court martial or promotion,"** remarked the commander of the American gunboat at Nanking when he gave the order to lay down the barrage that saved the lives of the American community at Nanking! What a commentary on the peace pacts when an American naval officer entrusted with the duty of protecting the lives and properties of his nationals and the honor of their womenfolk, must hestitate for fear of a court martial before discharging his elementary duty. Some day, the way things are going in China another incident will happen, and not in Manchuria, where the right of self-defense will again be invoked by some other military or naval officer in command of foreign forces and the League and the Kellogg Pact Signatories then will be placed on trial for attempting to outlaw war while declining to co-operate to prevent its causes.

We may not know much about these matters, but as we read the weighty opinions of the foremost exponents of international law and their interpretations of the Kellogg Pact, we incline to the belief that Japan's resort to self-defense in Manchuria is fully in line with their elucidation of how, when, and where, the principle can be invoked and applied. We cannot apply one principle in one part of the world and another principle in another part ; especially when the other fellow is big enough and strong enough to assert his equality.

G.B.R.

Thoughts on the Chinese Boycott

For Americans to Ponder Over

When Japan replies to Notes reminding her of her obligations under the Kellogg Pact by reiterating ; (1) that her actions since September 18 were purely in self-defense ; (2) that she has no intention to resort to war ; (3) that she is ready to negotiate directly with China and asks if a handful of Japanese troops outside of the railway zone can be regarded as a means of enforcing terms and (4) that the anti-Japanese agitation and severance of economic relations by China, violate both the spirit and letter of Article II of the Kellogg Pact ; she raises another question which the League will find as difficult to handle as the basic issue between China and Japan arising out of the validity of treaties extracted under duress.

As long as China arrogates to herself the right to sever economic relations with any nation with whom for the moment she may have a difference of opinion on political questions, applying the one instrument that the League as a last resort reserves to enforce respect for its decisions, and in so doing evades the plain provisions of the Kellogg Pact, it is difficult to understand how any basis of compromise is possible in such disputes. For any nation to submit to China's demands under such pressure, will only encourage her to further excesses, until the time must arrive when no nation having a dispute with China will submit its case to the League or to arbitration under compulsion. If all other nations are to abandon war as an instrument of national policy and China relies on these pacts for immunity against the use of force, her right individually to apply the only remaining weapon for enforcing international decisions, must receive immediate attention from those who frame the laws for world peace.

At the very outset of any consideration of this question, we come up against the fundamentals of the Kellogg Pact which recognizes the right of self-defense and the right of each nation to define it as it sees fit, together with recognition of the Monroe Doctrine and the British Regional Doctrine which permits America and Great Britain to extend and apply the principle of self-defense to regions outside their own jurisdiction. If the Chinese should now define the boycott or severance of economic relations as their right of self-defense, they will enlarge the hole in the Peace Pacts so that anyone can drive a tank corps through them and laugh at the traffic policemen. So we come back to the very wise observation made by Mr. M. Odagiri, the Japanese spokesman at the Kyoto Conference of the Institute of Pacific Relations in 1929, when he said :

"The continued application of the boycott as an instrument to settle international disputes is highly provoca-

tive and unjust . . . if war is to be condemned as an instrument of national policy, so also must the boycott be outlawed.''

The right of a nation to resort to war within the Kellogg Pact or to apply the weapons of the League at the very outset of a dispute in order to enforce compliance with its viewpoint, thereby provoking the other side to the use of force, becomes the paramount issue for the preservation of world peace. We cannot abolish war and leave to the discretion of any single power the sole right to apply the alternative before all pacific measures are exhausted. A boycott of another nation arising from the spontaneous action of an outraged public opinion is bad enough, but the Chinese boycott originates with the government and is enforced by associations, pickets, inspectors, special courts, fines, imprisonment and even capital punishment. These acts, together with interference with shipping, confiscation, burning or sale of cargo, after it has legally entered the country, and other highly unlawful and provocative acts are upheld by the Chinese courts as manifestations of pure patriotism. The Chinese boycott is war, in one of its most destructive and terrible forms. When applied against a nation which draws its food supplies largely from China, it is more effective than a naval blockade. Under the present interpretation of international law and the peace treaties, no nation may defend itself against this phase of warfare by actual force. China, therefore holds the whip hand and together with her oratorical advantages becomes a great world power, a formidable foe that no trading nation dares to antagonize.

There is one phase of the Chinese application of the boycott which at any time may precipitate a grave crisis in international relations and involve the League and the Peace Powers in another uproar over the interpretation of the Covenant and the treaties. Mr. Odagiri emphasized this when he invited attention to the fact that the anti-Japanese agitation and boycott of three years ago was more severe and destructive in those countries and islands to the South than it was in China Proper. In Saigon, Bangkok, Singapore, Batavia, Sourabaya, Manila and elsewhere in the South Seas, where the Chinese control the retail trade and to an increasing extent the import and export trade, there was a complete embargo not only on the purchase and sale of Japanese goods but on the loading and unloading of Japanese steamers and a refusal on the part of Chinese merchants to handle domestic produce or goods for export to Japan. In other words, where they control the machinery of trade, the Chinese have applied the boycott to the point where the interests of neutrals are affected with consequent hardship to the people and loss to the revenues of the governments concerned.

Fortunately, these former boycotts were of short duration, but if, as the Chinese now declare they will continue with increasing vigor the present boycott until financial and trade relations between the two countries are completely severed, the time cannot be long delayed when neutral governments will be drawn into the dispute and either compelled to enact laws prohibiting the boycott in their territories or take drastic steps to restrict Chinese activities in restraint of legitimate trade.

A case in point. The Chinese dominate the trade of Siam. The Chinese are so powerful in the economic life of this little Kingdom that the King has declined to enter into treaty relations with a nation whose diplomatic representative (especially under the old order of extraterritoriality) would have become a co-ruler of the country. Perhaps, when Siam is stronger, these conditions will change. For the present, the country is almost a commercial colony of Canton, with the Chinese merchants working in close harmony with the Kuomintang officials in their homeland.

The *Bangkok Daily Mail* in its editorial of November 27, says that in the present boycott against Japan, the Chinese rice-millers and rice-exporters of Bangkok are again refusing to export Siamese rice to Japan. They fail to realize that they are not hurting Japan, as there are other sources of supply which she can draw from, and that the only injury falls upon the country under whose laws and protection they have prospered. Perhaps in anticipation of being drawn into these never-ending Sino-Japanese disputes, the Government of Siam has enacted laws illegalizing the boycott and recent reports from Bangkok indicate they are being rigorously enforced. According to the *Bangkok Times*, the premises of all Japanese residents in Bangkok are strictly guarded against damage or injury to their occupants and all boycott literature has been confiscated from book shops and stalls. This situation, arising from the determination of the Chinese residents to enforce the boycott against Japan in a neutral country, has reached a point where the authorities are deeply concerned. As we write this, comes the news that the whole Chinese residence and business section in Bangkok has gone up in flames, entailing a loss of two and a half million gold dollars and leaving homeless over two thousand people.

In the absence of precise information as to the origin of the Bangkok fire, let us assume a hypothetical case. If investigation should reveal that it was the work of a Siamese incendiary, the motive would not be hard to seek, but it is safe to say that the Chinese would at once accuse the Japanese of having instigated the outrage. Here are all the ingredients of a case that would tax the Solons of the world to pass judgment upon.

Chinese merchants controlling the chief industry of a small, defenseless and pacific state, defy its anti-boycott laws and refuse to ship the produce of that country to Japan, thereby inflicting financial loss and hardhips upon its people. The Siamese Government cannot arrest and imprison a whole community. It cannot expel them. There is no redress against such defiance of its laws. Strong in their possession of great wealth and holding the country by its economic throat, the Chinese are for all practical purposes immune from the operation of the law. They are above the law.

Some Siamese patriot either on his own initiative or acting as the agent for some society or even for the authorities, secretly sets fire to the Chinese quarter. A dastardly crime, but it is safe to say that under such circumstances, the criminal would never be caught. But let us assume that he is apprehended and confesses the crime, pleading patriotism as justification for his action, would not his defense be identical in principle with that put forward by the Chinese boycotters who illegally seized and destroyed Japanese property in Shanghai and were absolved as patriots by a Chinese judge ?

If a Siamese patriot started the conflagration that destroyed the rich Chinese district of Bangkok and is caught and brought to justice, would the Chinese demand his conviction and punishment ? A patriot is a patriot, whether he fights for his country in China by committing criminal acts against Japan or whether he fights the Chinese in Siam with similar illegal weapons. Anyway, the hypothetical case is something for the advocates of Chinese lawlessness in Shanghai to ponder over. If the Chinese insist upon carrying their illegal war against Japan into neutral countries they invite retaliation at the hands of the people who are made to suffer.

Siam is not the only neutral country where the Chinese carry on the boycott with a high hand. There are, as pointed out, other places where incidents may occur to give rise to grave international consequences. In Manila, only the prompt and efficient action of the police has preserved law and order by suppressing at the outset the anti-Japanese parades, demonstrations and interference with trade. If the Manila authorities should relax their vigilance and permit free scope to the anti-Japanese ebullitions of the Chinese community, the United States Government would have to face another major incident in its relations with Japan either through a repetition of the Hongkong outrages or a dislocation of trade facilities that would lay us open to a charge of unneutral acts.

The people of the United States in their ignorance of what it all means, can afford to treat these matters lightly and philosophize over the efficacy of the boycott as an instrument of settling international disputes, but some incident may well arise in our own country to startle us out of our complacency. Some American newspapers seemed to think it a huge joke when the Pacific Commercial Bank of Seattle with a capital of $150,000, chiefly subscribed by Japanese, was compelled to close its doors recently owing to the withdrawal of their funds by Chinese depositors. Here was a bank in flourishing condition, with deposits in excess of $2,500,000 and undivided profits of over $62,000, but one half of its depositors were Chinese businessmen, who, as soon as the news of the national boycott reached America, started a run on the bank, inflicting hardship and loss on innocent American depositors and dislocating the trade and credit of the community because the Chinese carried their war against Japan into a neutral country !

The United States has enacted no laws against boycotts, for the reason that the exercise of this right is a purely private matter. But the Chinese resident in the country, safe from interference by the American police, are resorting to the same practices that have led to lawlessness and bloody reprisals in China. The head of the Chinese Trade Bureau in New York City stated early in October that orders for $750,000 worth of Japanese goods had been cancelled and *that the boycott was being enforced by a fine of $50 for any Chinese merchant who broke it !* This one statement from a responsible Chinese source indicates that the power of the tongs and the decisions of the Chinese Supreme Court which sits in San Francisco with branches in all the principal American cities, is still unbroken.

Let us quote from a report issued by the Singapore Chinese General Chamber of Commerce which invites attention to "the great economic power of the Chinese in Mexico, where their investments amount to nearly one twentieth of the entire wealth of the country. The amount of real estate now owned by Chinese in Mexico, the report states, is about six per cent of the landed property of the whole country and in one state, nearly sixty per cent of the land is owned by Chinese and their American associates."

According to Mexican reports of what happened recently, these Chinese have been exploiting the people, garnering huge profits and sending their funds out of the country after ruining countless small and even great native business men who are accustomed to another standard of living. As a result of public clamor and agitation, the authorities of the states of Sonora and Sinaloa have expelled the Chinese and confiscated their properties. If, in addition to these grievances, Mexico had a large and profitable trade with Japan and these Chinese merchants who control such a large part of the wealth and the retail trade of the country, should have carried the boycott to a point where this trade was destroyed, the consequences might well result in the United States being drawn into a dispute between Mexico and Japan that could not be so easily ignored as the request of China to our State Department to mediate with Mexico on behalf of its citizens.

Let us pursue this subject a little further. We read in the *New York Graphic* of November 20, that the On Leong and Hip Sing Tongs have buried the hatchet and are now raising funds for "*boycotting the Japanese*" and for training 3,000 war-pilots for the Chinese armies, presumably recruiting the men from amongst the Chinese youths resident in the United States. The Chinese newspapers in New York are urging an eternal boycott on all things Japanese and demanding that their "*countrymen rise and kill all Japanese.*" Here we have the mob psychology in China flaring up right in the heart of the biggest city in the United States. If, as a result of this hysterical and illegal campaign, the Tong gunmen turn patriotic and go gunning for Japanese and our police authorities are as incapable of apprehending the murderers as they are in rounding them up and bringing them to justice when they start in to kill each other promiscuously, we would be placed in a most embarrassing position. The police forces of all our principal cities have admitted their inability to cope with the periodic outbursts of Tong violence. Unable to apprehend or bring these foreign criminals to the bar of justice, our police, as a last resort, have had to threaten the entire Chinese community in New York City with deportation and then dicker with them to sign a truce. The police of America are baffled and never know even the motivating forces behind these murderous outbursts. Last year, the New York police force had to throw up its hands and depend upon the District Attorney and the Federal authorities to arrange a truce between the On Leong and Hip Sing factions which was signed in their presence and that of the Chinese Consul General in New York. The text of that treaty was :

> **"We, representing the above named Tongs hereby unqualifiedly pledge our respective Tongs to maintain peace and quiet and indulge in no acts of lawlessness from this day on. We hereby pledge ourselves to notify the United States authorities and the Chinese Consul General and the different Tongs throughout the country of this treaty of peace."**

Here we have a picture of the police force of the greatest city in the United States humiliated to the point where they have to confess their utter incapacity to cope with Chinese lawlessness and accept formal peace treaties between criminal gangs signed in the presence of the Federal and Municipal authorities and the representative of the Chinese Government, in lieu of discharging their duty to the community by rounding them up and deporting them. These solemn Tong truces are exactly like the peace pacts of the Chinese war-lords, made to be broken just as soon as the opportunity presents for one side to encroach on the territory of the other.

On the first of November, news dispatches from the United States state than another Tong war is in progress in which several have been killed and wounded, accompanied with riots and disturbances in many cities. If these Chinese Tongs should carry their economic warfare against Japan to the point of killing a few Japanese residing in the United States, and our confessedly impotent police fail to apprehend the murderers, our Government to save its face with Japan, would be forced to make good its threats of wholesale deportation. If that should occur, then the United States would become the enemy of China and our trade immediately subjected to a boycott because of our "unjust and inhuman oppression of peaceful, law-abiding, inoffensive Chinese citizens."

We never can tell. The Chinese boycott as an instrument of national policy in its world-wide application is no joke. If the American authorities should ever enforce respect for the law on the Chinese Tongs, we will receive a taste of what warfare under the Kellogg Pact really means. Viewed from this angle, our trade with China and the good-will of the Chinese people, is maintained by an abject surrender of the right to enforce our laws. The United States may yet have to face squarely the issue of asserting its sovereignty or inviting war with China, that is, a Chinese boycott placed into immediate operation in order to compel us to modify our viewpoint.

There is no use of blinking these facts. They challenge refutation. The average American in China is blissfully ignorant of the existence of forces whose release would start an anti-American agitation and blow him into bankruptcy within a few weeks. Even the Chinese banker, businessman and the higher officials of their government, know nothing of these facts. All they would see or be permitted to understand, would be the rank injustice of a wholesale deportation of reputable, law-abiding Chinese merchants by a brutal police force, with no knowledge of the patience, forbearance and sheer kindliness of these same authorities in dealing with a problem that has no other solution.—G.B.R.

Communications Extended

A working arrangement for the co-ordination of the landlines and radio, which is calculated greatly to strengthen the lines of quick communication between the United States and 30 other nations was recently announced by the Western Union Telegraph Company and R.C.A. Communications, Inc.

Through this arrangement, R.C.A. Communications, Inc. gains the use of terminal facilities for the collection and distribution of its traffic which it has heretofore lacked and Western Union will gain in having available R.C.A. radio circuits to 30 countries in Europe, Africa, Central and South America and the West Indies to augment its cables in handling the vast traffic for those regions which it collects through its 25,000 offices.

The arrangement is limited to a working agreement and involves no unification of properties or personnel of the two companies which retain their competitive status where the two services overlap. It is similar to the arrangements which have existed for many years between the Western Union and R.C.A. Communications, Inc. covering the delivery and pick-up of trans-Pacific traffic and with the Radiomarine Corporation of America, another R.C.A. subsidiary, for the land collection and delivery of messages to and from ships at sea.

Hereafter, all incoming messages over the Radio Corporation's vast network of wireless circuits will be turned over to Western Union for delivery except those points served by the Radio Corporation's own offices. Those points are New York, Boston, Washington and San Francisco where the Radio Company will continue to handle its own messages.

Correspondingly, Western Union offices except at the four places mentioned will be available for the acceptance of outgoing radiograms *via* R.C.A. Many of the R.C.A. circuits go to countries remote from the trans-Atlantic cable terminals and through its traffic connections it brings in a large volume of communications from those countries. It has been handicapped in its disposition of this traffic by the paucity of its terminal facilities within the United States. Western Union, on the other hand, will greatly strengthen its competitive position through the delivery of incoming radiograms and its close association with R.A.C. Communications, Inc. under the arrangement places it in a position to supplement its ten high capacity cables across the Atlantic with the wireless service whenever it can be employed especially in the handling of communications to countries not served by direct cables.

The Steel Industry of Japan

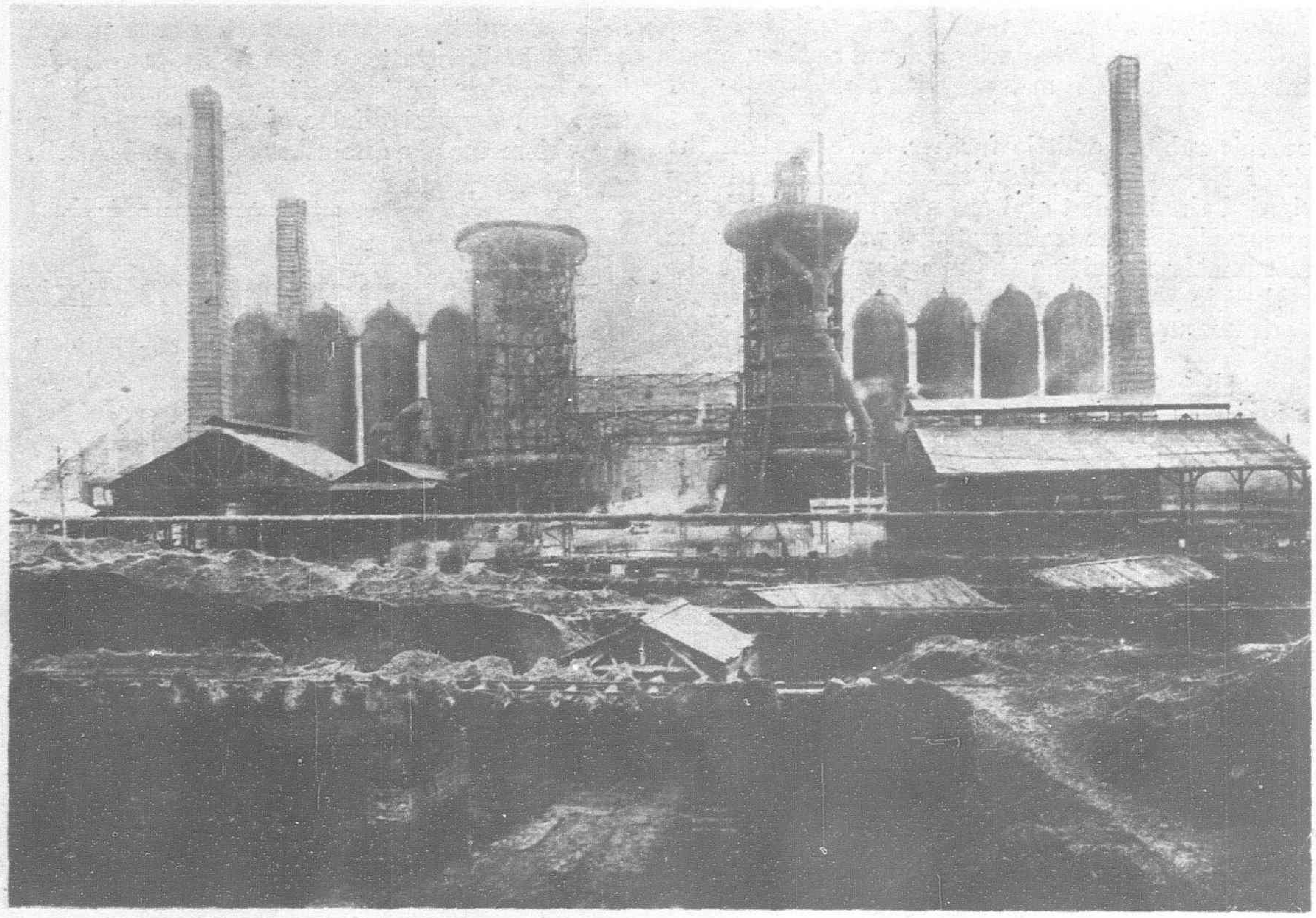
A SURVEY

By HAROLD HUGGINS

(Continued from November number).

As stated the Government pays a subsidy of Y. 6 a ton to manufacturers of pig-iron who use their own product to produce finished steel materials. The subsidy to the maker when the pig-iron is sold to others for steel-making, is Y. 5 a ton. As a consequence those makers unable to install their own ore-reducing equipment are practically forced to buy their pig-iron from the domestic makers. Efforts to induce the Government to raise import duties on pig-iron have failed because of opposition from the less important steel-makers, who fear that any rise in price in the pig-iron they import will force them into the hands of the makers of pig-iron who because of the subsidies they receive could undersell the finish d materials.

The whole purpose of the subsidy, increased duties, and general support the Government gives the steel-makers has for its end the placing of Japan in a position to shut out all foreign steel from Japan. Nothing definite is yet said about entering the markets of the Far East in competition with the rest of the world, but there is little doubt that this ambition is swelling in the bosoms of the makers, and their government supporters.



Kamaishi Blast Furnaces

In the last four years Japan has gone a long way towards realizing its intention of freeing itself from foreign steel. There is hardly a shape or size of any kind of steel which is not made, or which is not planned for making in Japan to-day. It has frequently been said by foreign makers that Japan *can not* make certain shapes, just about the time this opinion has bolstered up declining courage, Japan *does* make that particular shape, and makes it perfectly good enough for all practical purposes. The generally asserted opinion that Japan cannot make good steel has been disproved by results. Japan's steel is as good as any other country's steel.

It has often been said that the costs of making new shapes are prohibitive because so many mistakes and changes in operation must be made before a satisfactory product is placed on the market. This may be true. But the fact remains that a satisfactory product is finally placed on the market, and imports then begin to drop in volume.

It used to be very volubly asserted that Japan could never make steel because there were no trained workmen in the country to handle the more difficult, or more delicate operations. The Japanese steel industry has been in operation now for some 25 years. If in that time a group of remarkably interested makers has not been able to develop an intelligent working class then there has been something radically wrong with their methods, or with the material they have had to work with. And no one has yet accused the Japanese of being lazy, or incapable. It stands to reason that with the exception of the more robust physique of the Occidental steel worker, in intelligence the Japanese is not behind him. To-day it is doubtful if there are any workers in the Japanese steel mills not capable of grasping a new idea quickly and satisfactorily. Rolling new shapes, then, which require great care and attention, should be well within the abilities of the Japanese steel workers, and such operations should be attended with no more errors than an entirely new operation would cause in an Occidental mill.

With a growing body of skilled workmen, a growing wealth of experience, a developing iron ore resource, and a growing market for steel, there is every reason why the Japanese steel makers should bend their energies first to putting an end to import competition; and then, second, to making a try at the export market in the Far East.

From 1926 till 1929 Japan has occupied the ninth position as a world steel maker, with a total of 1,562,000 tons produced in 1929.

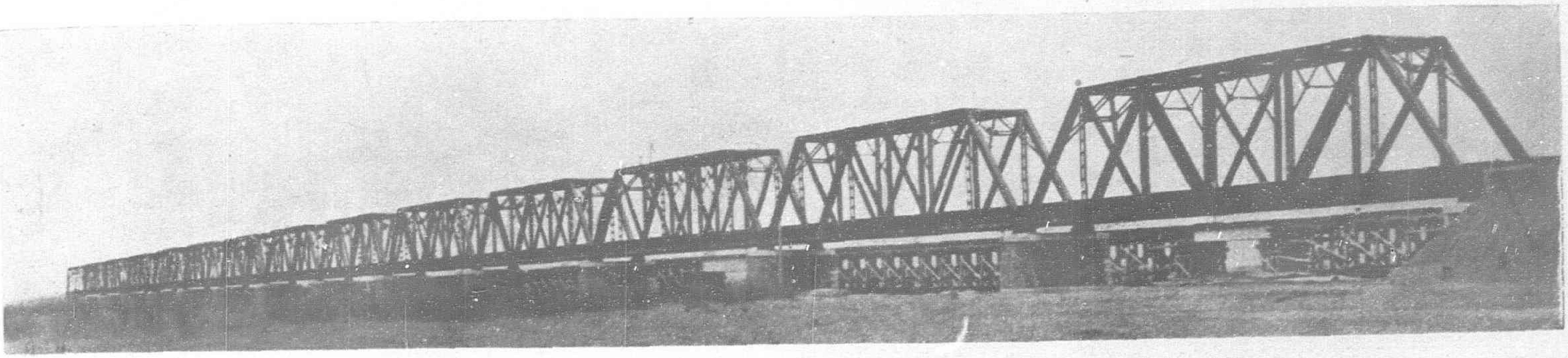
The Japanese steel makers to-day all use the openhearth method, using the basic process. There is a very small amount of Bessemer steel made by the less important plants, and a growing use of the electric furnace.

The following table shows the production of billets in Japan from 1923 to 1929, inclusive, according to the method of production.

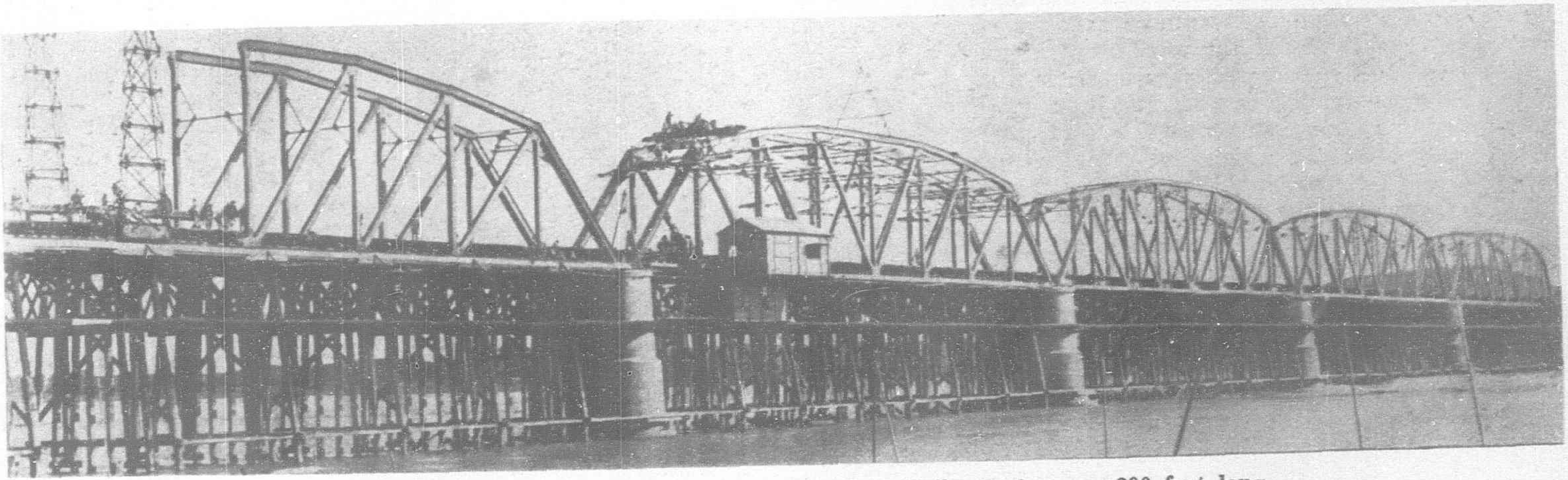
Year (Kilo tons)	*Open-Hearth*	*Bessemer*	*Electric*	*Crucible*	*Other*	*Total*
1923	847,725	103,474	6,292	1,517	—	959,008
1924	1,018,680	67,821	11,985	797	408	1,099,691
1925	1,208,580	74,923	15,496	1,204	—	1,300,203
1926	1,400,632	84,677	18,159	2,747	—	1,506,215
1927	1,569,552	87,998	26,517	1,175	—	1,685,242
1928	1,863,391	3,340	37,746	1,503	—	1,905,980
1929	2,238,217	1,048	52,797	1,778	—	2,293,340
1930	—	—	—	—	—	2,255,000

JAPAN'S STEEL INDUSTRY ASSUMES IMPORTANT POSITION

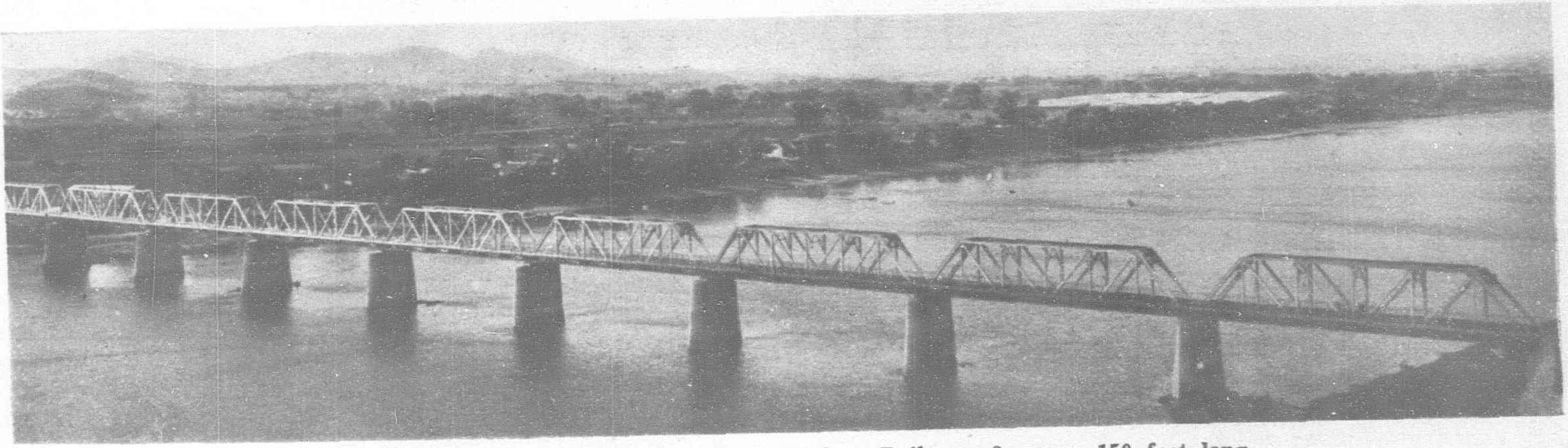
Types of bridges made by the Kisha Seizo Kaisha of Osaka



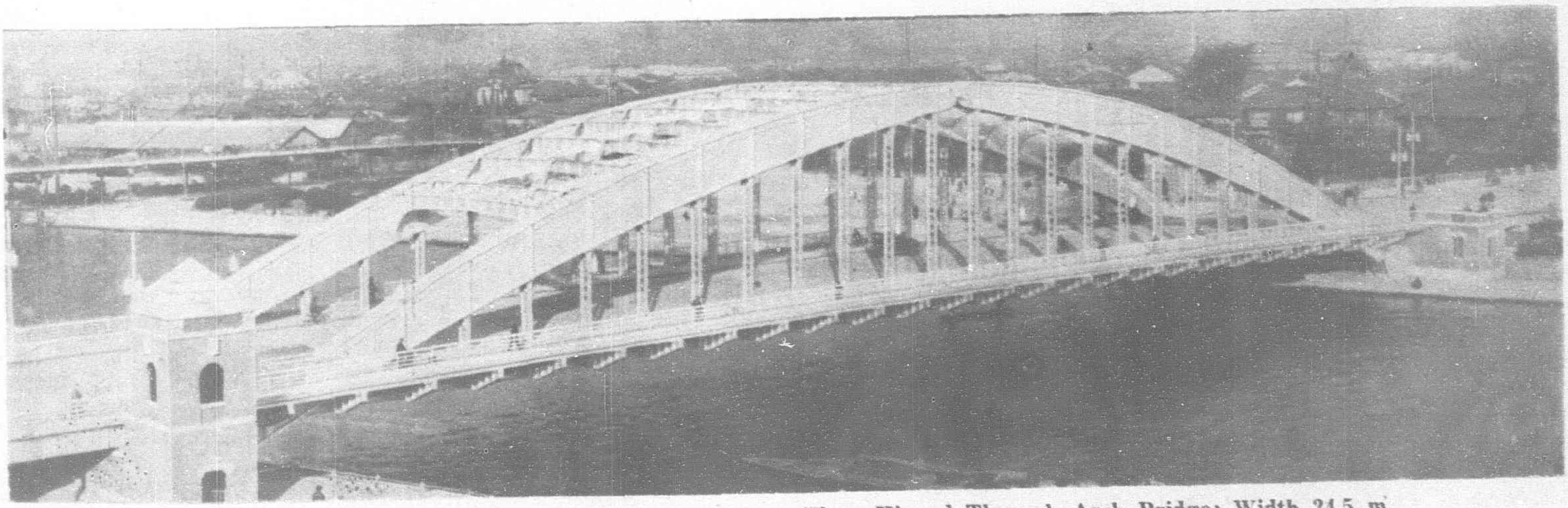
Through Pratt Truss Bridge for Ssupingkai-Taonan Railway; 14 spans, 150 feet long



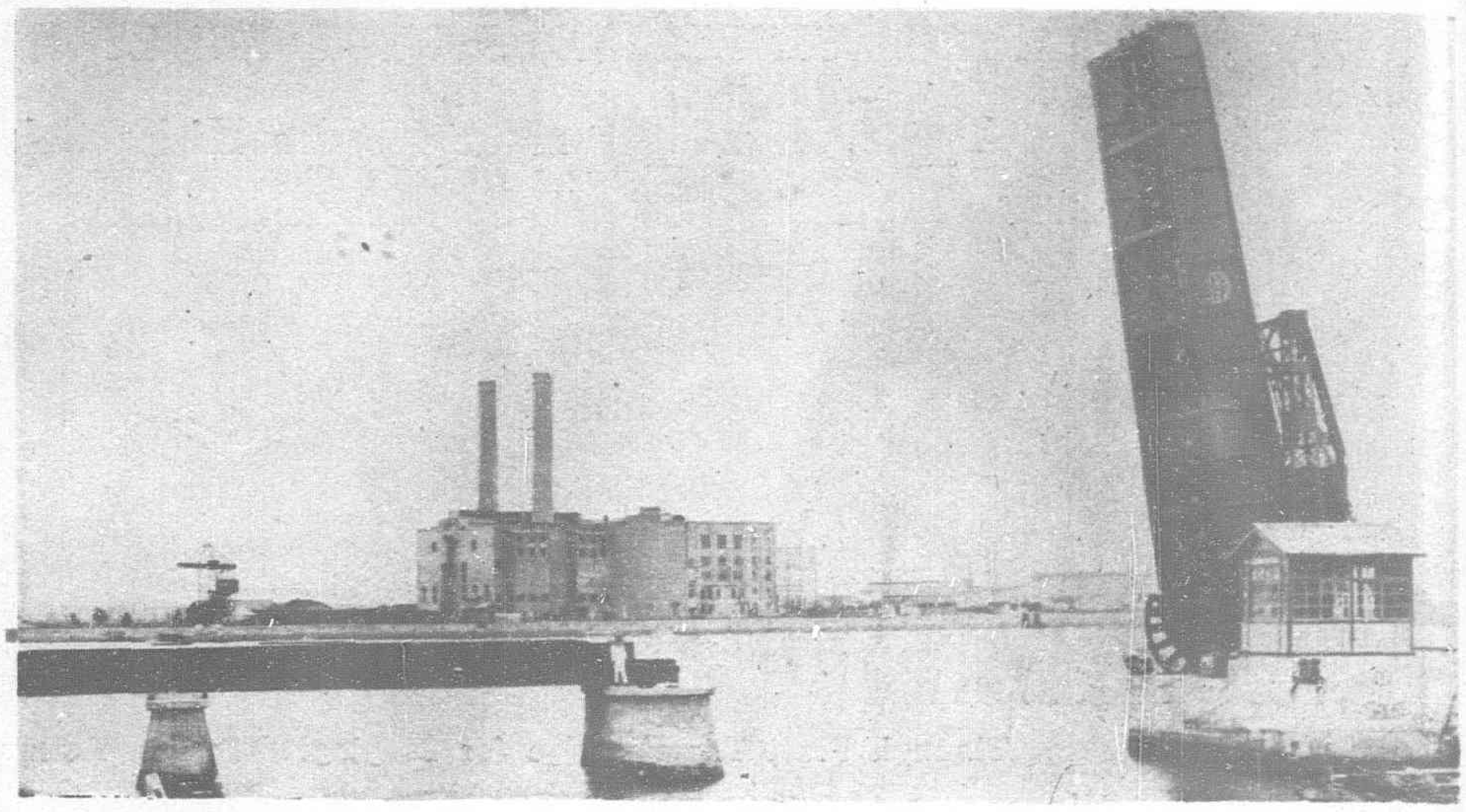
Through Pratt Truss Bridge for Nanchang-Kiukiang Railway; 6 spans, 200 feet long



Through Pratt Truss Bridge for the Kirin-Tunhwa Railway; 9 spans, 150 feet long



Sakuranomiya Bridge, Osaka; 104 meters C. C. Pins Three-Hinged Through Arch Bridge: Width 24.5 m.



73-ft., 6-in. "railway Bascule Bridge, Made by Kisha Seizo Kaisha of Osaka for Yamamoto Interests

Although the Mitsubishi Seitetsu K.K. Kenjiho Works are equipped to produce large sections and thick plates, there has been no production of steel in that plant since 1922. There is no steel produced in Manchuria.

BILLETS.—At the end of June 1930 there were thirteen private companies producing billets in Japan, and the Yawata Steel Works, making fourteen makers in all. The potential capacity of all their furnaces was 2,545,900 kilo tons; and for the first half of 1930, they produced 1,185,892 tons. The private makers producing 475,300 tons, and the Yawata Steel Works, 710,592 tons.

There is very little import of steel billets. In the first half of 1930 there were only 50,360 kilo tons imported, about 4.5 per cent of the total production in Japan. The total supply during the first half of 1930 was 1,236,252 tons.

Total production of billets at Yawata last year (1930) was 1,193,582 tons. Private mills have not yet reported their output for the second half of the year. But if the total given in the table above for 1930 is correct (the figure is that of the Department of Commerce and Industry (Bureau of Mines), then private production the second half of 1930 must have been 587,018 kilo tons. In which case Yawata's production fell the second half of the year, and private makers increased their output.

The Japanese billet makers are:

Maker	*Talbot*		*Capacity of Furnaces*										*Annual*
	200	*60*	*50*	*40*	*30*	*25*	*18*	*16*	*15*	*12*	*10*	*8*	*Capacity*
Yawata	2	11	6	—	—	12	—	—	2	—	—	—	1,087,500
Nihon Seiko Sho, Muroran mill		—	3	—	—	4	—	—	—	—	3	—	228,750
Kamaishi Kozan		—	—	—	—	3	—	—	—	—	—	—	56,250
Asano Zosenjo		—	2	—	—	—	—	—	—	—	—	—	75,000
Nihon Kokan		—	—	—	2	7	—	—	—	—	—	—	176,250
Fuji Seiko		—	—	—	—	—	—	—	4	—	—	—	45,000
Oshima Seiko		—	—	—	—	1	—	—	2	—	—	—	41,250
Tokyo Kozai		—	—	—	—	—	—	—	—	—	2	—	15,000
Osaka Seitetsu		—	—	—	—	3	—	—	—	—	—	—	56,250
Hamuro Chuko Jo		—	—	—	—	—	—	—	—	—	—	2	12,000
Sumitomo Seiko Jo		—	—	1	—	—	1	—	—	—	—	1	49,500
Sumitomo Shindo		—	—	—	—	3	—	—	—	—	—	—	56,250
Kawasaki Sharyo		—	—	—	—	1	—	—	—	—	2	—	33,750
Kawasaki Zosenjo Sheet Mill.		—	—	—	—	9	—	—	—	—	—	—	168,750
Kobe Seiko Jo.		—	—	1	1	2	—	1	—	1	1	—	111,000
Assano Kokura Seiko.		—	—	—	3	—	—	—	—	—	—	—	56,250
Kyushu Seiko.		—	3	—	—	—	—	—	—	—	—	—	112,500
Karatsu Seiko		—	—	—	—	—	—	—	—	—	1	—	7,500
Mitsubishi Seitetsu		3	—	—	—	—	—	—	—	—	—	—	112,500
Total	2	11	17	2	3	49	1	1	8	1	8	2	2,501,250 kilo tons

(Figuies as of the end of 1929).

There are four companies in Japan which still have equipment for producing Bessemer steel, these are:

Company	*Furnaces*	*Annual Capacity*
Azuma Seiko Jo ...	1	5,000 kilo tons
Mitsubishi Zosenjo, K. K. Kobe Plant	1	5,000
Hiroshima Tekkojo K. K.	1	400
Karatsu Seiko Jo K. K....	1	2,000
Total	4	12,400 kilo tons

(December 31, 1929)

But the production of Bessemer steel has about come to an end in Japan. The little now produced, 1,048 tons in 1929 was used for castings.

The use of the electric furnace is growing slowly particularly by small companies using scrap metal for re-rolling, and by makers of special steels.

The electric furnace equipment of each company the end of 1929 was as follows:

Company	*Capacity of Furnace in Kilo tons.*										
	10	*6*	*5*	*3*	*2.5*	*2*	*1.75*	*1.7*	*1.5*	*1*	*.75*
Tokyo Kozai	—	1	—	1	—	—	—	—	—	—	—
Hattori Seisakujo	—	—	—	1	—	—	—	—	—	—	—
Azuma Seiko	—	—	—	—	—	1	—	—	—	—	—
Nihon Kokan	—	—	—	1	—	—	—	—	—	—	—
Nihon Tokushu	—	—	—	1	—	—	—	—	1	—	—
Daido Denki Seikojo, tsuta Mill	1	—	1	—	—	—	—	—	—	—	—
Sumitomo Seiko Jo	—	—	—	1	—	—	—	—	—	—	—
Kawasaki Sharyo	—	—	—	2	—	—	—	—	—	—	—
Kobe Seiko Jo	—	1	—	—	—	—	—	1	—	—	—
Nihon Seiko Sho, Hiroshima Mill	—	—	1	—	—	—	—	—	—	—	—
Mitsubishi Zosenjo, Nagasaki Mill	—	—	—	—	—	—	—	—	—	—	1
Same: Electric Steel Mill	—	1	1	—	—	—	—	—	—	—	—
Nihon Chuzo	—	—	—	1	—	—	—	—	—	—	—
Nihon Chuko	—	—	—	1	—	—	1	—	—	—	—
Daido Denki Seikojo Tsukiji Mill	—	—	—	—	—	1	—	—	—	—	—
Komatsu Seisakujo	—	—	—	—	1	1	—	—	1	1	1
Nihon Chuko	—	—	—	—	—	—	—	—	2	—	—
Osaka Seisa	—	—	—	—	—	1	—	—	—	—	—
Yonaga Seiko	—	—	—	—	—	—	—	—	1	1	—
Kaneko Chuko	—	—	—	—	—	—	—	—	1	—	—
Anrai Seiko Jo	—	—	—	—	—	2	—	—	—	—	—
Tobatta Imono, Tokyo Mill	—	—	—	—	2	—	—	—	—	—	—
Yawata	—	1	—	—	1	—	—	—	—	—	—
Total	1	4	2	10	5	6	1	1	6	2	2

Production of crucible steel is confined to a few companies. Their equipment is listed below:

Company	*Capacity of Crucibles Kilo tons*										
	8	*7*	*4*	*2.7*	*2*	*1.8*	*.9*	*.6*	*.4*	*.3*	*.24*
Yawata Steel	—	—	7	—	—	—	—	—	—	—	—
Nihon Seiko Jo, Muroran Works	—	—	—	—	2	—	—	—	—	—	—
Oshima Seiko Jo	—	—	—	—	—	—	—	1	—	—	—
Nihon Tokushu Ko	2	1	—	—	—	—	—	—	—	—	—
Daido Denki Seiko Jo, Atsuta Mill	—	—	—	—	—	—	—	—	1	—	1
Mitsubishi Zosenjo Kobe Works	—	—	—	—	—	—	—	—	—	6	—
Yonago Seiko Jo	—	—	—	1	—	1	3	—	—	—	—
Total	2	1	7	1	2	1	3	1	1	6	1

(As of end 1929—from same source as the other tables showing equipment, preceding: "Seitetsu Gyo Sanko Shiryo" June 30, 1930.)

FINISHED STEEL MATERIALS

The total production of all kinds of finished steel materials in Japan is given in the table below. (The Yawata steel works sales department figures are taken from the Seitetsujo Hanbaibu *Hanbai Junpo* of February 2, 1931). The same figures compiled by the Department of Commerce and Industry are given below:

Material	*1930* *Kilo tons*	*1929*	*1930* *Compared with 1929*	
Rolled Steel Materials.				
Total ...	1,794,500	1,888,443	5%	decrease
Sheets: 0.7 m.m. and less	226,435	193,276	17%	increase
Same: others ...	333,677	359,260	7%	decrease
Bars ...	446,278	617,991	28%	,,
Structural shapes ...	251,979	259,812	3%	,,
Rails, etc. ...	301,289	278,717	8%	increase
Wire rods ...	122,913	67,790	81%	,,
Tubes ...	88,518	78,526	13%	,,
Other materials ...	23,411	28,071	17%	decrease

Considering the very poor year for steel that 1930 really was a decrease of only 5% in production is a remarkably good showing. This table shows where this result was obtained.

Production of Steel Materials in Japan, 1928-1930. In kilo tons : together with Imports, for the same period: Grand total showing supply from all sources.

Material	*Production at Yawata Steel Works*			*Production at Private Plants*			*Total Production in Japan*			*Imports*			*Grand Total Supply*		
	1930	*1929*	*1928*	*1930*	*1929*	*1928*	*1930*	*1929*	*1928*	*1930*	*1929*	*1928*	*1930*	*1929*	*1928*
Round Bars	83,676	123,333	105,919	251,948	365,963	334,467	335,624	489,296	440,326	22,524	69,610	45,538	358,148	558,906	483,864
Square Bars	24,540	17,684	18,247	5,418	6,781	6,800	29,958	24,465	25,047	2,556	6,741	5,830	32,514	31,206	30,877
Flat Bars	45,762	66,308	55,581	14,935	14,935	17,145	60,697	81,243	72,726	10,714	17,342	17,483	71,411	98,485	90,209
Angles	89,263	95,521	98,106	93,221	97,976	93,668	182,484	193,497	191,774	14,918	25,157	22,764	197,402	218,654	214,538
Structural Shapes ..	27,998	25,225	27,332	—	—	—	27,998	25,225	27,332	5,539	26,056	14,369	33,537	51,281	41,701
Channels	38,913	35,753	32,019	—	—	—	38,913	35,753	32,019	10,021	10,751	9,447	48,934	46,504	41,466
Sheet Piling	—	—	—	—	—	—	—	—	—	33,232	28,551	23,767	33,232	28,551	23,767
Other bar mill products	1,515	4,081	2,084	5,358	7,527	8,835	6,873	11,608	10,919	6,898	5,950	2,400	13,771	17,558	13,319
Total	311,667	367,905	339,288	370,880	493,182	460,855	682,547	861,087	800,143	106,402	190,158	139,598	788,949	1,051,245	939,641
Sheets, over 0.7 m.m..	155,319	165,762	148,162	162,275	177,752	156,159	317,594	343,514	304,321	45,196	57,183	69,973	362,790	400,697	374,294
Same, under 0.7 m.m..	28,605	27,934	25,997	186,885	145,169	75,161	215,490	173,103	101,158	27,446	79,873	183,468	242,936	252,976	284,626
Silicon Sheets . ..	5,348	3,287	3,376	—	—	—	5,348	3,287	3,376	7,451	10,248	9,706	12,799	13,535	13,082
Checquered Sheets ..	3,751	4,358	2,497	—	—	—	3,751	4,358	2,497	2,182	2,690	7,677	5,933	7,048	10,174
Tin Plate	22,430	17,879	16,390	—	—	—	22,430	17,879	16,390	68,912	81,564	72,113	91,342	99,443	88,503
Universal Plates ..	2,916	784	1,887	—	—	—	2,916	784	1,887	—	—	—	2,916	784	1,887
Total	218,369	220,004	198,309	349,160	322,921	231,320	567,529	542,925	429,629	151,187	231,558	342,937	718,716	774,483	772,566
Rails : Heavy ..	254,355	242,036	177,929	—	—	—	254,355	242,036	177,929	5,421	15,351	24,582	259,776	257,387	202,511
Rails : Light	28,697	22,441	16,938	3,174	1,365	4,092	31,871	23,806	21,030	6,835	18,133	20,870	38,706	41,939	41,900
Accessories	16,331	13,540	11,719	—	—	—	16,331	13,540	11,719	887	1,440	4,619	17,218	14,980	16,338
Total	299,383	278,017	206,586	3,174	1,365	4,092	302,557	279,382	210,678	13,143	34,924	50,071	315,700	314,306	260,749
Axles, Rims	6,380	8,406	11,588	9,279	7,959	10,906	15,659	16,365	22,494	809	2,749	2,148	16,468	19,114	24,642
Wire Rods	76,603	61,763	50,769	45,828	6,026	6,820	122,431	67,789	57,589	68,684	157,474	172,644	191,115	225,263	230,233
Tubes	—	—	—	88,338	76,269	64,460	88,338	76,269	64,460	28,201	63,049	53,859	116,539	139,318	118,319
Other material ..	5,598	6,079	2,693	2,914	3,540	5,698	8,512	9,619	8,391	3,280	2,303	2,787	11,792	11,922	11,178
Grand Total ..	918,000	942,174	809,233	869,573	911,262	784,151	1,787,573	1,853,436	1,593,384	371,706	682,215	764,044	2,159,279	2,535,651	2,357,428

Their table shows conclusively what a large part of the Japanese steel industry is filled by the Yawata Steel Works. It produces about 55% of all the steel made in Japan. The more difficult operations of rolling are not attempted by the private makers, and it is to the Yawata Steel Works that any advance in technique in the Japanese industry is due. When the Yawata Works have satisfactorily produced new material then the private makers follow the established lead.

The tendency to cut off imports has progressed to such an extent that in 1930 imports fell to only 17.2% of the total supply. In 1928 imports were 32.9% of tne total domestic supply for the year. Of course, 1930 was not by any means a usual sort of year, but this decline in imports will continue for it can easily be seen from the figures given how the domestic product has been taking the place of the imported. This is especially noticeable in such items as bars, thin plates, light and heavy rails, wire rods, and steel tubes.

1. *Bars.*

It is particularly in the manufacture of bars that the Japanese steel makers have driven imports out of the market. In 1930 of a total domestic production of 426,279 tons (kilo), imports were only 8% of this amount. Of the total domestic supply, imports were only 7%.

There are several associations that regulate the sale and production of the domestically made bars. They are:

A. Round Bars :
    1. Kanto Kozai Hanbai Kumiai (Kanto Steel Sales Guild).
    2. Kozai Rengo Kai (Steel Association).
B. Round, Flat, and Square Bars :
    1. Joko Bunya Kyotei Kai.

This last association controls prices, and has a great deal to do with restricting production over fixed periods. There is no special association covering square bars, because the Yawata Steel Works by agreement controls the manufacture of this commodity.

An agreement between the Yawata Steel Works and the private makers limits the Yawata production as follows :

Round Bars : Exclusive right to produce all sizes over 1⅞th inch.
Square Bars : Everything over 2 inches
Flat Bars : Everything over 2 inches

The private makers have exclusive rights of production of

Round Bars : from ½ to 1⅞ inch in diameter.
Square Bars : Everything under 2 inches
Round Bars under ½ inch and flat bars under 2 inches in diameter may be produced by anyone.

Most of the private mills roll bars from remelted scrap steel.

The Japanese makers of bars are :

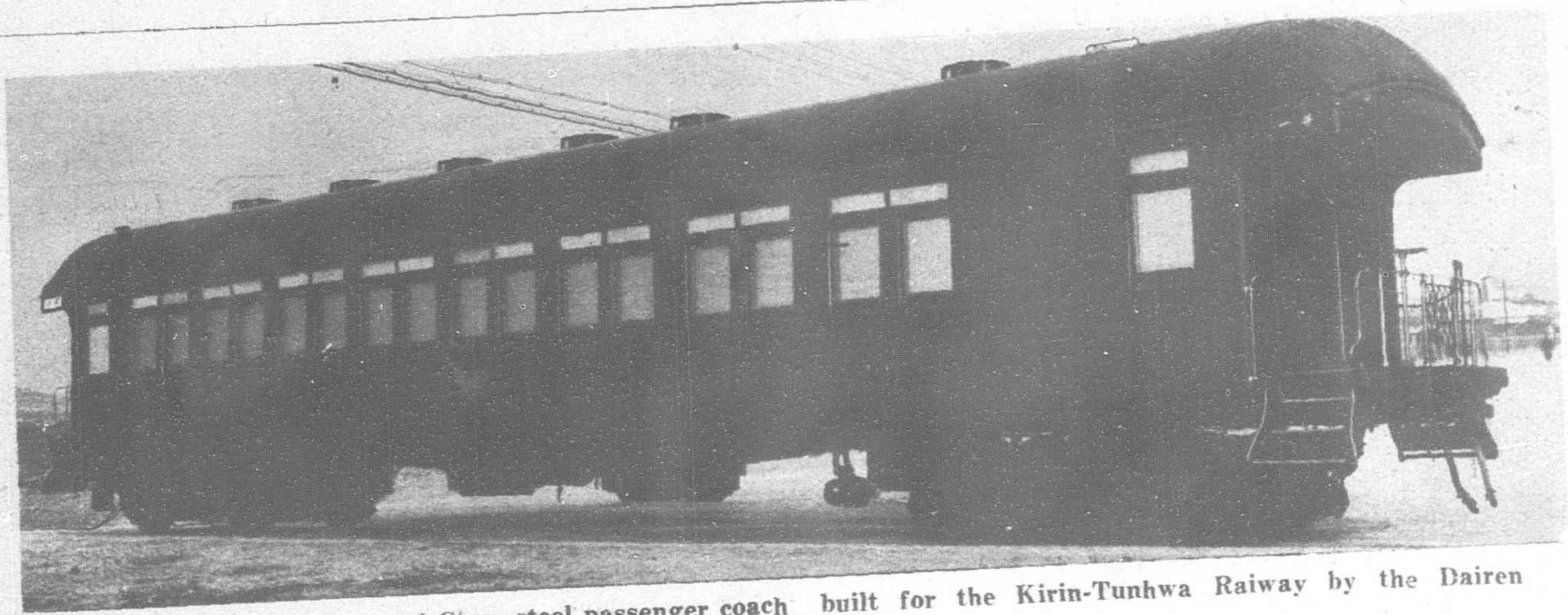
1. Yawata Steel Works
2. Nihon Seiko Sho K.K.
3. Kamaishi Kozan K.K.
4. Tokyo Kozai K.K.
5. Nihon Kokan K.K.
6. Fuji Seiko K.K.
7. Osaka Seitetsu K.K.
8. Sumitomo Shindo K.K.
9. Kobe Seikojo
10. Kawasaki Sharyo K.K.
11. Asano Kokura Seiko Jo
12. Tokyo Kogyo K.K.
13. Mitsubishi Seitetsu K.K. (Chosen)

Besides these there are several plants making special steels that on occasion roll bars, but only small quantities : These companies are :

1. Daido Denki Seiko Jo
2. Yonago Seiko Jo K.K.
3. Anrai Seiko Jo K.K.
4. Kyushu Seiko K.K.

(To be Continued)

500-ft., Railway Spandrel-Braced Arch Bridge, Made by Kisha Seizo Kaisha of Osaka for the Imperial Government Railways

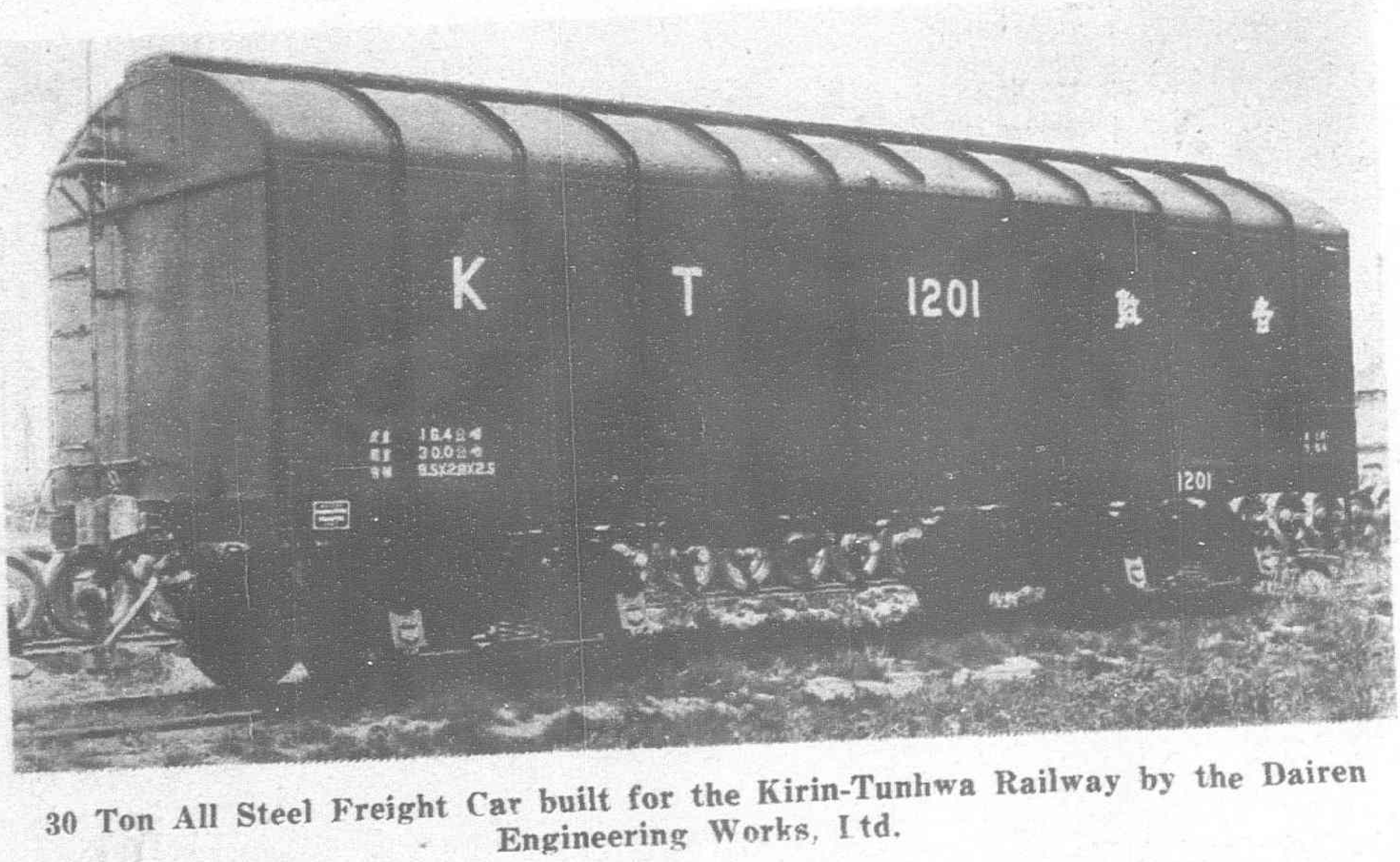


Composite First and Second Class steel passenger coach built for the Kirin-Tunhwa Raiway by the Dairen Engineering Works, Ltd.

Railway Equipment Market in Manchuria

Assistant Trade Commissioner LOUIS C. VENATOR, Tientsin,
and Trade Commissioner JOHN J. EHRHARDT, Mukden

THE poor financial condition of North China railways during the first half of 1931 restricted their purchases of materials in most cases to absolute requirements, so that the total volume of such business fell considerably below the levels of the past two or three years. The only rolling stock purchased was 16 British locomotives for the Tientsin-Pukow Railway, bought with returned British Boxer indemnity funds, and four locomotives and one hundred 40-ton cars, obtained from the South Manchuria Railway by the Kiaochow-Tsinan Railway. The Peiping-Liaoning Railway was expected to open tenders for 20 locomotives in July, the funds to be advanced by North China banks.

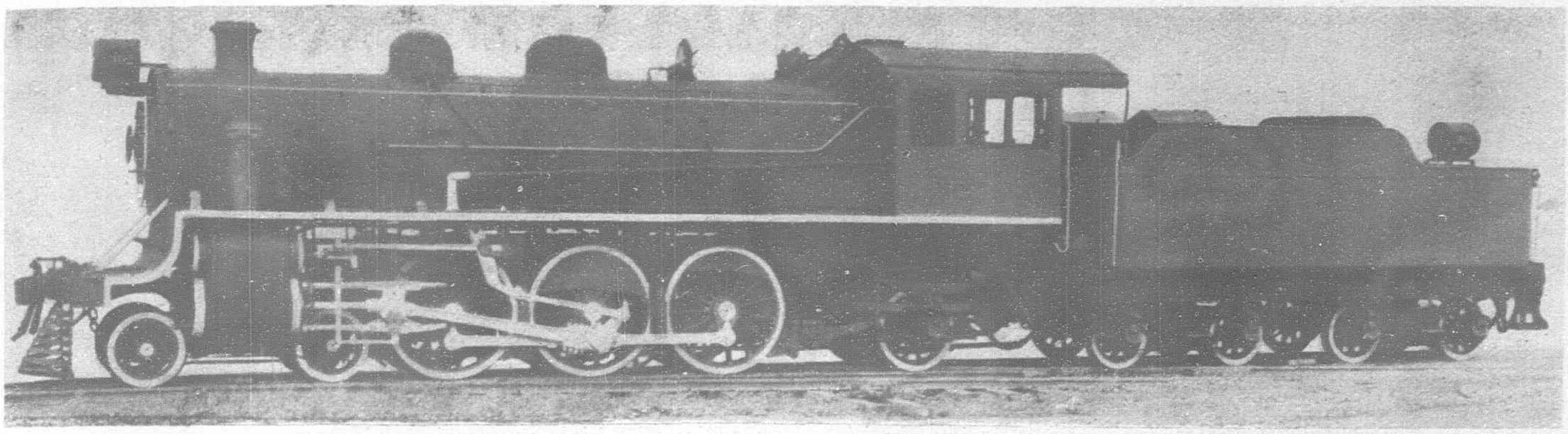


30 Ton All Steel Freight Car built for the Kirin-Tunhwa Railway by the Dairen Engineering Works, Ltd.

Factors Lowering North China Buying Power and Operating Efficiency

Rolling stock, roadbed, and other materials on all railways showed further deterioration during the first half of 1931. The Peiping-Liaoning Railway, financially the best situated in North China, suffered from a considerable amount of military traffic, from a division of revenues between the Mukden and Tientsin administrative offices, and from the necessity of making monthly payments (said to be $95,000) in gold currency toward the construction of a new port at Hulutao—a heavy burden under the depreciation in silver exchange since the signing of the contract.

All Steel Third Class Passenger Coach, built for the Kirin-Tunhwa Railway by the Dairen Engineering Works, Ltd.



Pacific Type Locomotive built for Kirin-Hailung Railway by the American Locomotive Company

As a result of these conditions, the Peiping-Liaoning Railway has been unable to make a number of purchases scheduled for this year, even canceling a number of contracts entered into late in 1930. Purchases for the Peiping-Hankow and the Tientsin-Pukow Railways were limited.

Operating schedules on all North China railways, except the Peiping-Hankow Railway, where through traffic was irregular as the result of military operations and the later floods, showed some improvement during the first half of 1931, particularly on the Tientsin-Pukow and the Peiping-Liaoning Railways, where through schedules from Pukow to Kirin were maintained most of the time. Nevertheless, it was generally felt that the amount of traffic resulting, particularly between Mukden and Kirin, did not justify the tying up of railway stock required in this through service. The Peiping-Suiyuan line continued only restricted operations as a result of serious lack of rolling stock ; this condition still exists, though some equipment was loaned by the Peiping-Liaoning Railway and some shop equipment was purchased that enables old cars and locomotives to be repaired.

Importation of Railway Materials into North China

Imports of railway materials during the first six months of 1931 were valued at 1,327,476 haikuan taels as compared with 647,416 haikuan taels for the similar period of 1930. This appearance of business improvement is somewhat misleading, however, as a large share of the articles imported during the current year were contracted for and purchased prior to January 1 ; the actual new business closed since that date has been considerably below the average maintained last year. The business done during the current year has been largely in metals, replacement parts, car furnishings, and a small amount of technical shop equipment.

Purchases of Rolling Stock by Manchurian Railways

Most recent purchases of rolling stock have been of local or European manufacture, on account of the difference in price. The shops of the South Manchurian Railway Co. and of another semi-private shop known as the Dairen Engineering Works have offered both locomotives and cars at prices considerably below those offered from Europe and as much as 20 to 30 per cent below American prices. In a recent purchase of 30 passenger cars, those made at Dairen were sold at prices which were approximately 75 per cent of the price of the lowest American offering.

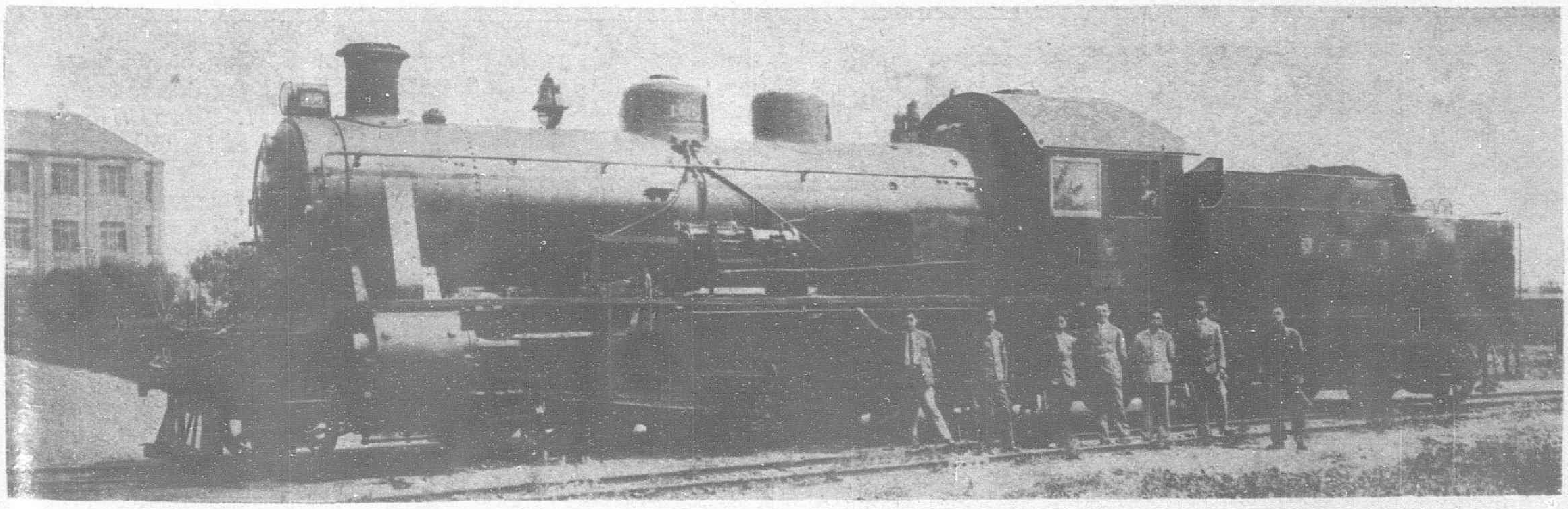
Czechoslovak manufacturers have furnished the bulk of the locomotive business during the past three years, at prices approximately 25 per cent below those offered from American concerns. These locomotives have not been in use long enough to give a definite statement as to their serviceability, but so far they seem to have met the requirements of the Chinese Government Railways. They have been supplied equipped with feed-water heaters and with a polished finish, both of which items have made quite an impression on the Chinese engineers.

Local Production of Equipment

Even though the railway shops of the Chinese Government Railways are lacking in equipment they have made considerable progress in the manufacture of parts and accessories, such as lubricators, injectors, air compressors, valves, fittings, car-heating equipment, and other equipment on which patents have expired. In one of the small Mukden shops some of these parts are turned out with only a few of the most elementary machine tools, 80 per cent of the work being accomplished by hand. Under present conditions the Chinese Government Railways have found it necessary to get along with the minimum of accessory equipment. The future market for high-grade equipment, however, should be better.

Besides the local output of cars and locomotives mentioned before, a development of considerable interest to importers of railway materials was the manufacture, or more technically the assembly, of a locomotive at the Tongshan shops of the Peiping-Liaoning Railway. Although many parts and patented appliances were imported, more parts were locally produced from imported materials than heretofore. This locomotive was put into service

(Continued on page 765)



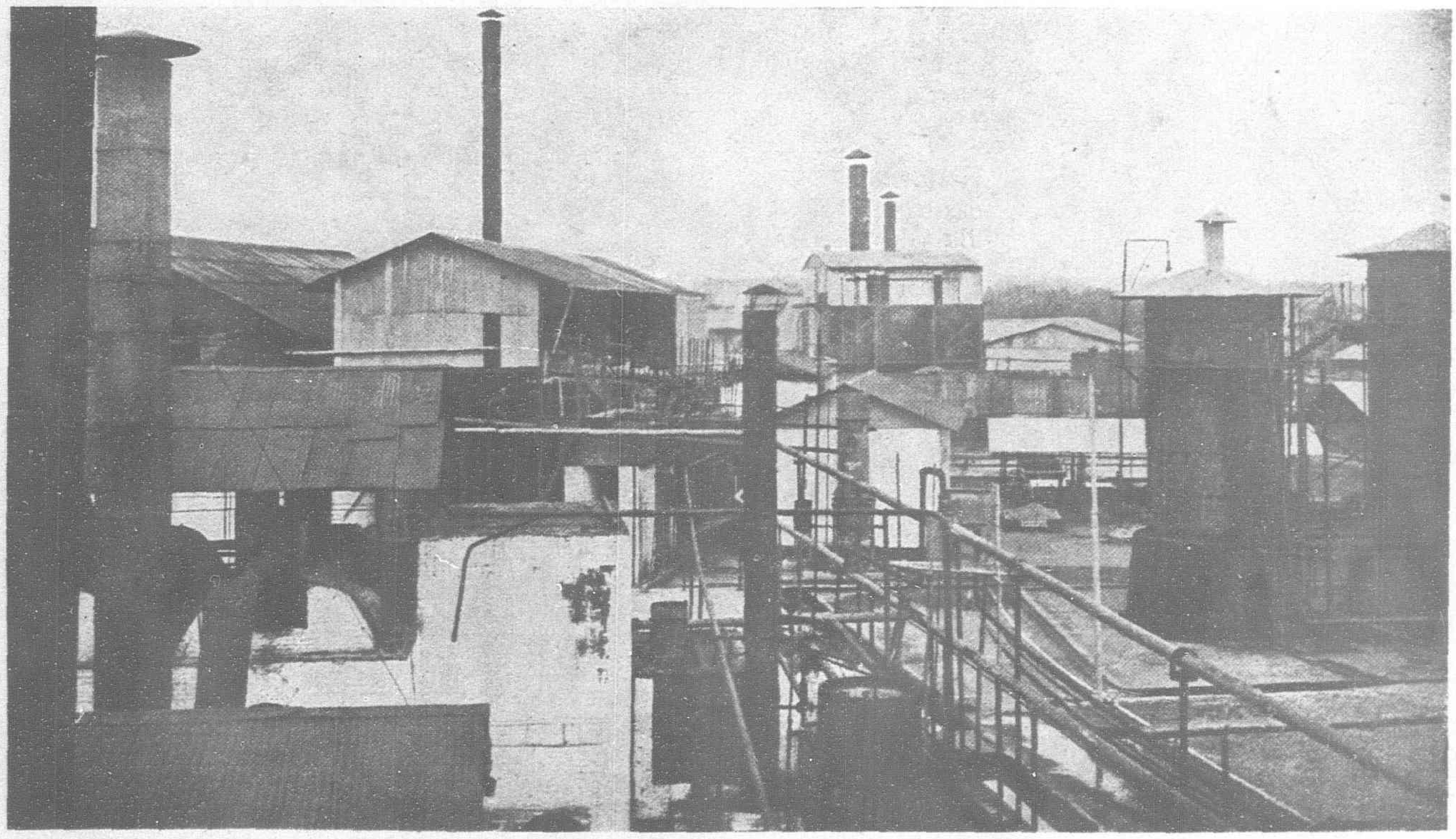
Twenty-four of these 2-8-2 Two-Cylinder, Superheated, Standard Locomotives were supplied to the Tsitsihar-Koshan Railway by the Skoda Works of Prague.

Petroleum Resources of Asia*

China

In China are two well-recognized oil-yielding provinces, Shensi and Szechuen, the most important district being in east-central Szechuen, west of Tze-liu-ching, about 100 miles west of Chungking and south of Chintu. About 18 miles south of Tze-liu-ching there is also a heavy seepage, and gas is constantly emitted from crevices in the rocks. There are about 50 wells in operation in this province, the majority of which are in the Tze-liu-ching district. The production of the province amounts to about 30,000 barrels a year.

The production of oil in China has hitherto been entirely incidental to the salt industry, in which it is used as fuel. The wells have been stated to yield from 15 per cent to 50 per cent of oil, and from 50 per cent to 85 per cent of brine, the average proportion being about 33 per cent oil and 66 per cent brine. The crude oil so far produced burns with a clear flame and is a good illuminant.



Bataafsche Petroleum Works at Tjepu, N.E.I.

The geological formations in China, as they have been reported, follow :—

Tertiary sandstone, yellow.
Limestone, grey.
Sandstone, red.
Oolite, orange-colored, with petroleum at 600-ft.
Limestone, yellowish, with gas at 300-ft.
Marl, bluish grey, iridescent, white Permian chalk with brine 12 per cent to 15 per cent at 1,000-1,800-ft.
Schists, greenish, strong brine and flow of gas at 2,500-3,300-ft.

Dutch East Indies

The islands of Borneo, Sumatra and Java rank amongst the most important known sources of petroleum, and indications of oil in commercial quantities have also been found in the Celebes and Ceram islands.

The principal producing areas are :—(*a*) In Dutch Borneo, the Koete and Tarakan areas on the east coast, covering about 500 square miles ; (*b*) in Sumatra, Langkat in the east, Perlak in Atchin Residency, and Palembang in the south ; and (*c*) in Java, Semarang, Rembang and Soerabaya provinces in the north-east.

The oil-bearing strata are of Tertiary age, and generally associated with coal and lignite.

Borneo crude oil from Koetei has been found to contain an exceptionally high proportion of aromatic hydrocarbons, and is, therefore, valuable as a source of high explosive material, particularly toluol. Tarakan petroleum is a natural fuel oil, while Sumatra produces an oil very rich in petrol.

In the Koetei district of Dutch Borneo, the oil occurs mainly in Miocene sandstones, along anticlines with steeply-dipping sides, and is associated with heavy gas-pressure. The shallow sands in the Koetei fields yield heavy oil of 0.970 specific gravity, with paraffin. The lighter oils from deeper sources are poor in paraffin, and possess a specific gravity varying between 0.860 and 0.890.

The specific gravity of the Langkat oil of North Sumatra is given as from 0.771 to 0.857. In South Sumatra, the specific gravity of the oil from Meliamoen is from 0.765, to 0.775, of that from Kampong Minjak 0.792, and of that of the oil from Babat 0.812 to 0.889.

In Java, the chief petroliferous horizon occurs at the junction of the Upper and Middle Miocene ; the wells are quite shallow, varying in depth from 500-ft. to 800-ft., and require pumping. The oil has a specific gravity of from 0.825 to 0.916, and is of asphaltic base, yet yields paraffin wax of high melting point. Production in 1930 was about 5,700,000 tons.

Japan and Formosa

The belt of oil-producing territory extends along the west side of North Japan, from the west coast of Sakhalin Island on

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*From *Oil News*.

the north, along the coast of the Sea of Japan, through the west side of the central mountain range of Hokkaido, thence stretching across the provinces of Mutsu, Ugo, Uzen, Echigo and Shinano, to the Pacific coast of Totomi in the south. The principal producing districts are Akita in the province of Ugo and Niigata in the province of Echigo. The producing sandstones are of Tertiary age, interstratified with beds of slate or shale, and most of the production is obtained from shallow wells less than 700-ft. in depth.

Drilling first took place in Echigo in 1890, when the Nippon Oil Company successfully brought in a well in the Amaze field, and the development of other districts rapidly followed. The first gusher was brought in at Kurokawa, in the Akita district, in 1914, with an initial production of 10,000 barrels a day. Several others have since been obtained, and in 1916 a new field was proved along an anticline in the Urayama district, parallel with a similar fold in the Kurakawa field. The output has, however, gradually declined, that of 1918 being 101,728 tons less than that of 1915.

The production for 1930 was about 325,000 tons.

In Formosa indications of petroleum, which have been discovered in Formosa in about 300 localities, occur in 26 oil belts extending for at least 400 miles along the west coast. The Byoritsu and Tabanti fields in the north have already been proved, and the Nairo and Kosempo fields in Ako district, the Senschuiryo field in Tainancho, and the Rokiyukei field in Kagicho are all being exploited.

Persia

The oil fields of Persia, ranking among the largest in the world, extend in a south-easterly direction along the western and southern sides of the Persian plateau adjoining Mesopotamia, the Persian Gulf and Gulf of Oman, across the Turco-Persian frontier between the Diyaleh (or Sirvan) River and Mendeli, and enter the Persian province of Kermanshah. Thence they run south-east through the provinces of Luristan, Arabistan, and the Bakhtiari country forming the northern area, and the Behbehan Fars and Laristan forming the southern area.

Production last year was some 6,000,000 tons.

The main stratigraphical divisions are as follows :—

1. The Asmari Series (Cretaceous to Oligocene): Thickness, 2,000-ft., principally massive limestones, succeeded by—

2. The Fars Series (Miocene): More than 7,000-ft. thick, divided into three groups :—The Lower Fars, formed of some 3,500-ft. of massive gypsum, shales, clays and intercalated beds of limestone; the Middle Fars, consisting of 1,000-ft. of clays, shales, intercalated gypsum, limestone and sandstone; and the Upper Fars, forming 2,700-ft. of clays, shales and intercalated sandstones. The Fars series is overlaid by—

3. The Bakhtiari Series (Pliocene), of which the lower group consists of 13,000-ft. or more of clays, sandstone and conglomerate, and the upper of 2,000-ft. of massive conglomerate.

The principal oil field—the original and famous Maidan-i-Naftun field and its extensions—lies in the district having Masjid-i-Sulaiman (Solomon's Temple) for its center, some thirty-five miles east of the ancient Persian city of Shushtar, the oil being found directly beneath the foothills that give on the high range of the Bakhtiari Mountains, which form the great barrier between the desert plains to the south and south-west, and the great central plateau of Persia. Between the extreme well in the north-west of this Masjid-i-Sulaiman oil field and the extreme well in the south-east is a distance of about 17 miles.

At Abadan there is a large refinery for the treatment of the crude oil from this field and also a modern port at which the tankers take in crude oil for shipment to the Anglo-Persian Company's new refinery at Skewen, Llandarcy, South Wales, and refined products for other destinations.

Another important oil field has been opened and is in course of rapid development at Naft Khaneh in Iraq, some 100 miles north-east of Baghdad; and a third important field is being developed at Haft Kel, about forty miles south-south-east of Masjid-i-Sulaiman.

India

Oil has been found to a small extent in the Punjab and Baluchistan, but the main petroleum-producing region of India is in the east, *i.e.*, in Burma and Assam.

By far the greatest supply of oil in India comes from Burma, where the chief oil-bearing area runs north and south, along the basins of the Irrawadi and Chindwin rivers. In the 400 miles along which indications exist, only isolated spots in a section of the belt about 90 miles long have been found sufficiently profitable for development up to date, the chief fields being Yenangyaung (Magwe district), Singu (Myingyan district), and Yenangyet (Pakokku district). The Yenangyaung field is the most important, its three sections being Twingon, Khodaung and Beme. All these fields are connected by pipe lines which continue to the refineries at Rangoon. Other areas in which petroleum occurs are Chindwin, Shwebo, Minbu, Thayetmyo, Prome, Henzada, and the Arakan region, comprising Ramri and other small islands. The work done in these districts has, however, been principally of an exploratory nature, though increasing amounts of oil are now being won from Chindwin and Minbu.

The oil occurs in anticlines and domes of the Pegu series (Miocene and Oligocene), often projecting as small hill ranges through plains consisting of Irrawadi sandstone (Pliocene) and recent surface deposits. In a few places the Nummulitic series (Eocene) are petroliferous.

The Yenangyaung field is situated on the left bank of the Irrawadi, about 270 miles north of Rangoon and 130 miles south-south-west of Mandalay. A denuded dome forms at the surface an elongated ellipse of Pegu beds, surrounded by an outcrop of Irrawadi sandstone. The oil occurs in a complex series of lenses, streaks and beds of sand, varying considerably in thickness at different points and situated at various horizons in impervious clays. In 1914 productive sands were tapped at a depth of nearly 3,000-ft.

The oil has a specific gravity varying from 0.800 to 0.950.

The Singu field is 30 miles north of Yenangyaung, upon the same bank of the Irrawadi, and the main producing portion of the Yenangyat field lies 30 miles still farther north, upon the opposite bank of the river. Both fields are situated upon a single asymmetric anticlinal fold, which rises and pitches in three places, producing local dome-structures, each of which forms a separate oil field. At Singu the oil sands are fairly constant and occupy two main horizons, one at about 1,500-ft., and the other at 1,850-ft., whilst at Yenangyat there is much inconstancy, which is also characteristic of the Yenangyaung field.

The oil-belt of Assam is crescent-shaped and some 800 miles in length from the extreme north-east of the province to the islands off the Arakan coast of Burma.

Petroliferous beds of Eocene age underlie an extensive area in Northern Punjab, between Rawal Pindi and Shalpur.

The total production of India last year was about 1,150,000 tons.

Sarawak

The producing field is in the Miri district of Sarawak. Last year's production was about 830,000 tons.

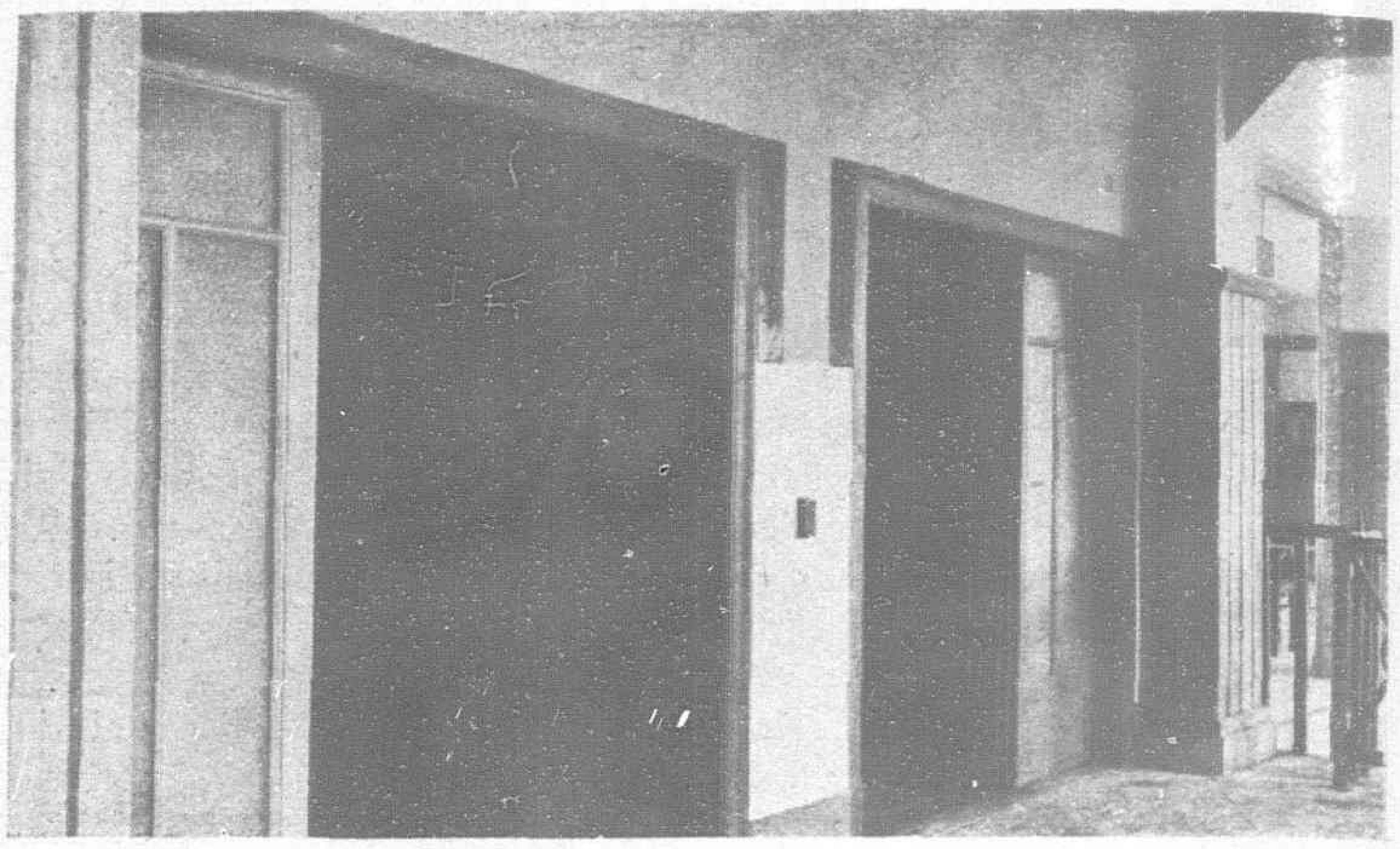
Philippine Islands

Petroleum occurs as a very light paraffin-base oil, at various points in the Philippine Islands, notably in the Bondoc Peninsula, at Toledo and Algeria in the Island of Cebu, and at Tayabas and Luzon. Indications are also reported to occur on the islands of Palawan, Leyte and Mindanao, whilst the islands of Panay, Guimaras, Negros and Bohol appear worthy of further investigations.

Sakhalin (Russian)

For a distance of nearly 200 miles and in a belt six miles to 12 miles wide along the Pacific Coast of the northern half of Sakhalin, oil indications have been reported in the Tertiary sandstones. Asphalt is found in all stages of density, from the consistency of tar up to a hard, smooth-surfaced mass resembling an asphalt floor. The lake near Oha Creek, over 1,000-ft. long, 400-ft. wide, and from 2-ft. to 6-ft. deep, is estimated to contain more than 25,000 tons of a tough asphalt-like substance comparatively free from foreign matter. Little development work has so far been done. Production is now about 180,000 tons per annum.

Restaurant containing Upper Landing and Machine Room



View of Elevator Lobby and Cars, Top Landing

Kegon Waterfall Elevator Installation

In pursuance of the policy of the Japanese to develop their tourist business, the Kegon Waterfall Company recently made an elevator installation of unusual and outstanding proportions, comparable in many ways to the installation on the Canadian side of the Niagara Falls.

The Kegon waterfall is located at the outlet of Chuzenji Lake, near the city of Nikko, one of the most popular resorts in Japan. The lake, which is probably the crater of an extinct volcano, is located about 2,600 feet above sea level and is drained by a narrow river, which falls 300 feet into a deep gorge.

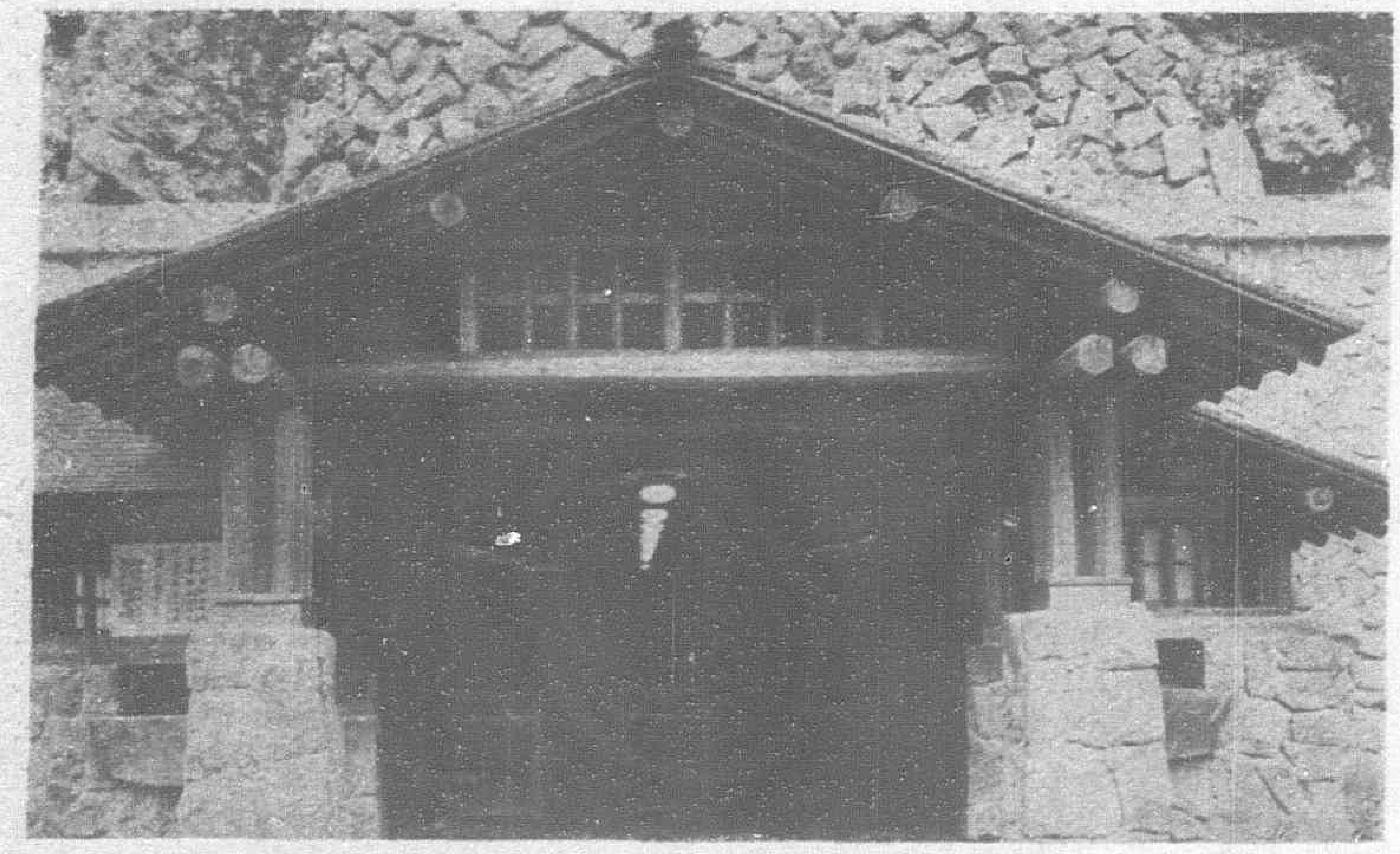
In order to permit visitors to obtain a view of the falls from near the bottom without the necessity of making the long and difficult descent by a tortuous mountain path, the Kegon Waterfall Company conceived the idea of sinking a shaft 325 feet deep from the bank of the river and digging a tunnel 120 feet long from a point near the foot of the falls to the bottom of this shaft. After almost insuperable difficulties had been overcome, this project was finally carried through to completion.

In sinking the shaft through the solid shale-like rock formation, numerous veins of water were encountered. The water from these veins flows in a constant stream between the rock of the shaft and its concrete lining and is carried off by a separate passage under the horizontal tunnel.

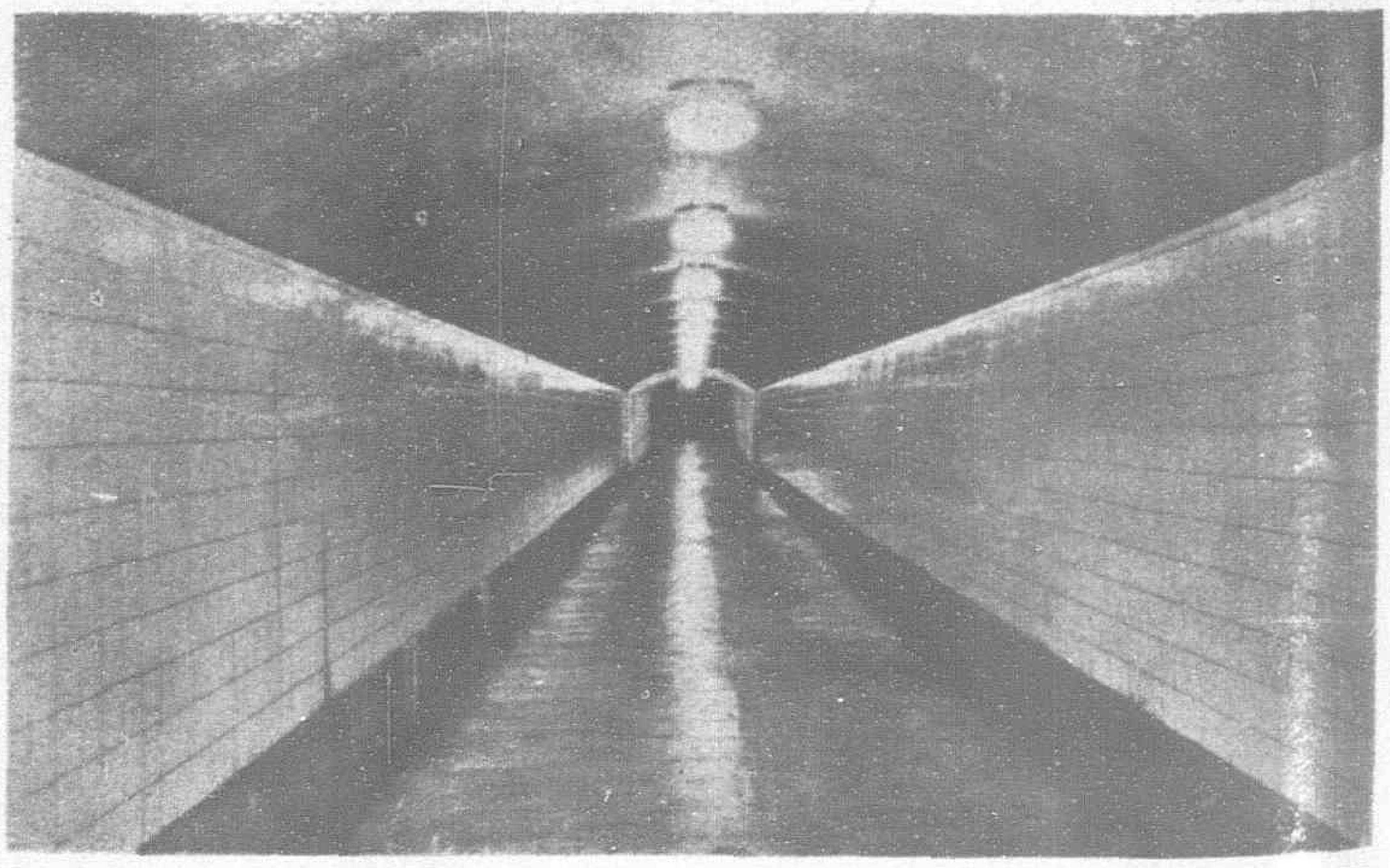
Kegon Waterfall as viewed from a point near the end of the Funnel

The contract for the elevators was placed with the Otis Elevator Company of Tokyo and consists of two car switch control elevators travelling 325 feet and each having a load capacity of 4,000 lbs. and a speed of 350 feet per minute. The car enclosures are of special design manufactured in pressed steel by the Otis Elevator Company and the installation is, of course, equipped with all the usual safety devices. The interesting feature is a vertical illuminated position indicator having an electric light indication for each 25 feet of elevator travel installed in each car and at each landing. This is the same type of indicator as is usually installed for the different floor levels and markings. As the shaft is quite damp owing to the fall of water between the face of the rock of the shaft and the elevator concrete-lined well, it was necessary to provide rubber covered travelling cables, and other electrical portions of the installation are protected against excessive dampness of the shaft, likewise the elevating ropes are kept well lubricated for the same purpose.

While the power is purchased from the main power supply coming through that district, the Kegon Waterfall Company have also installed automatic Diesel engine driven generators to furnish power in the event of failure of the main power supply.



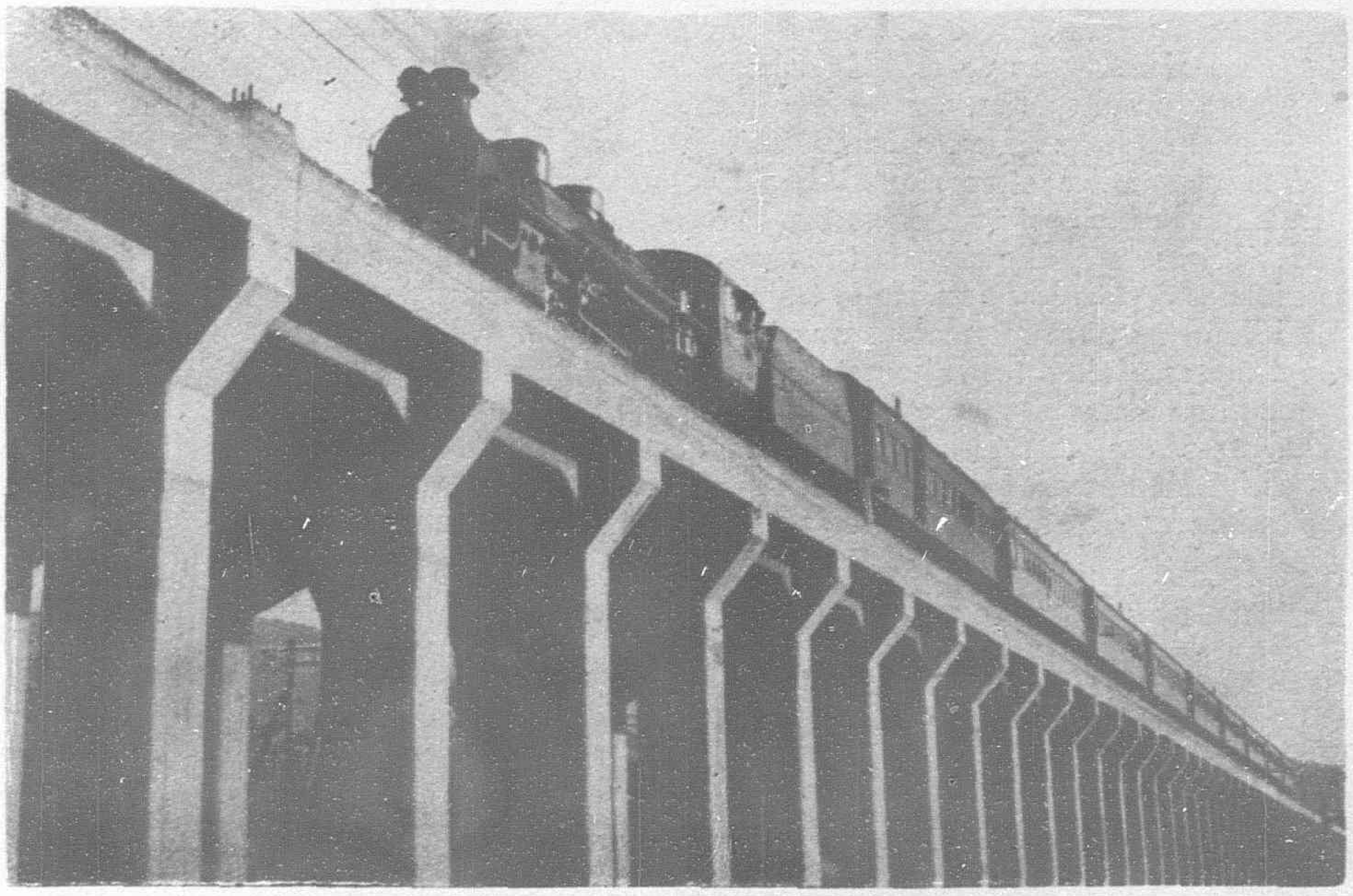
Opening of Tunnel at River End



Tunnel at Bottom Landing, Lower Elevator Entrances in the distance

Kobe's Elevated System Solves Traffic Problem

By EISABURO KUSANO



First train running on Kobe's new elevated system, morning of October 10, 1931

An elevated system of the Japanese Government railway running through the business center of Kobe has just been completed at the cost of Y.30,000,000. This is the first and the most important step taken to revolutionize the traffic network of the city.

The endless expansion of any modern city, by necessity, causes its lines of traffic to develop from street level to overhead or underground, and this elevated system of Kobe is an example of just such progress. For Kobe, a lonely fishing village a little more than half a century ago, has now grown into a city with a population of 800,000 and also into one of the most thriving trade centers of world commerce. Besides, the city has as its neighbor the Empire's greatest industrial and commercial metropolis—Osaka. Such growth and geographical advantage cannot but stimulate the volume of local traffic to expand. And, it had long been felt that the surface railway within the city limits had become a grave detrimental factor to the further progress of the city.

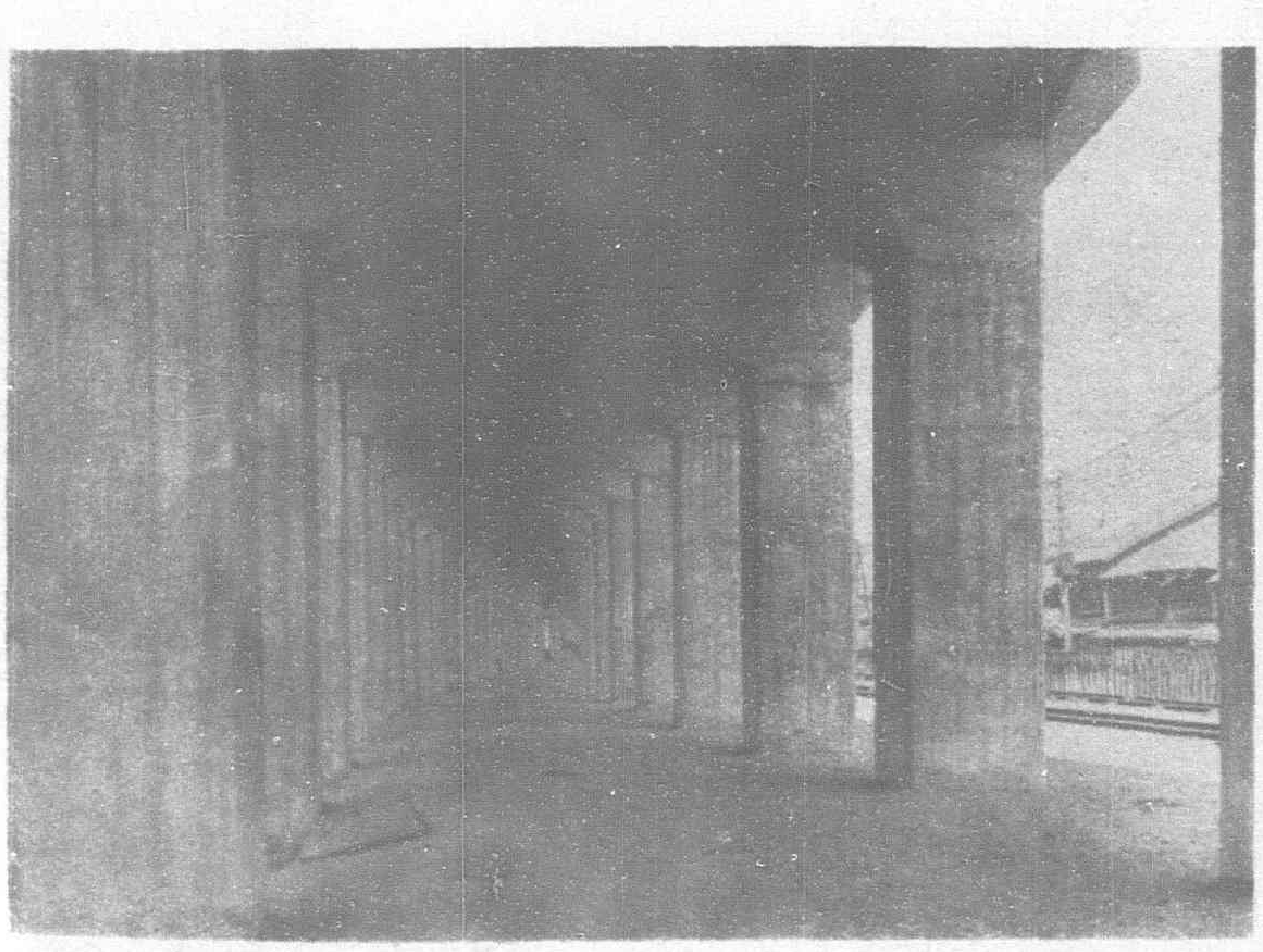
Kobe is a narrow strip of city extending from east to west, sandwiched between the sea and hills. The Government railway runs also from east to west through the most active business center of the city. Until the present elevated system was opened, therefore, it hampered the local traffic immensely. No better picture of the situation in the pre-elevated system days, so to speak, can be presented than by merely mentioning the fact that there were 33 crossings along the 11 kilometers of the Government railway in the city zone; 14 between the Nada and Sannomiya Stations, five between the Sannomiya and Kobe Stations, nine between the Kobe and Hyogo Stations, and five between the Hyogo and Takatori Stations. The traffic over these crossings was naturally suspended each time a train passed, and from 181 to 190 trains were daily operated along this line. The situation was particularly deplorable during the morning and evening rush hours when a larger number of trains was operated. Between 8 and 9 o'clock in the morning, the Government railway ran 16 trains, with 14 between 5 and 6 o'clock in the afternoon, these representing the largest number of trains run in a single hour during the morning and evening. It meant that theoretically all vehicles and pedestrians were barred at these 33 crossings at intervals of 3 minutes and 45 seconds during the morning rush hour and at intervals of 4 minutes and 17 seconds in the evening rush hour. In practice, the situation was even worse than that, as the crossing-bars were naturally put down some time prior to the actual passing of the trains and the intervals between the trains passing during the morning and evening hours were therefore further reduced.

Now that the elevated system is completed and is open, however, it has not only relieved the people of Kobe of this great nuisance, but also has enabled the railway authorities to run trains more frequently without fear of hampering the local traffic system.

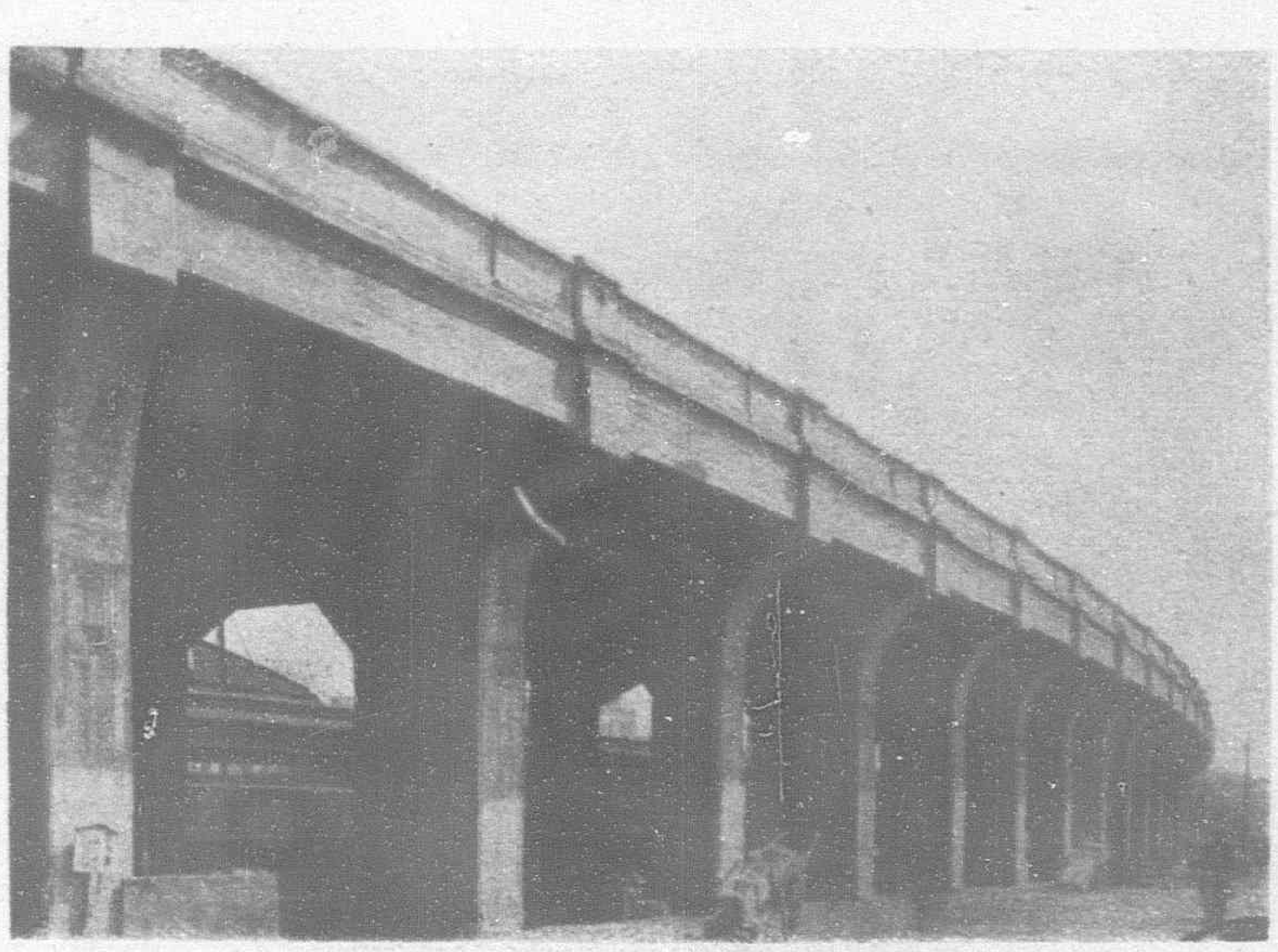
Readjustment Plan

It was as early as 1893 that the first petition was filed with the Department of Railways asking that the Government tracks in Kobe be removed out of the city's business center. Later developments gave rise to another question, that of increasing the transport capacity by the construction of additional double tracks side by side with the existing lines. But the construction of additional double surface lines was considered to be out of the question in view of the fact that the then existing tracks had already proved detrimental to the city's traffic development, especially as automobiles were on the way to becoming the main means of transportation. Hence the resulting study of plans to build either an elevated or an underground system through the city.

The railway authorities, the Municipality, and others concerned, however, had different opinions as regards which one of these systems



Slab system of the elevated: Open space underneath rails to be utilized by shops



Section of elevated system where work is completed should be adopted. Nor did they agree, to make the situation still more difficult, as to exactly where the projected elevated or the underground system should be constructed.

In the end, however, a compromise was reached to the effect that an elevated system should be built along the existing lines from Nada in the east to Takatori in the west of the city, a distance of 11.2 kilometers, allowing on the surface of the elevated system a sufficient space to lay quadruple tracks. Of the entire distance of 11.2 kilometers, 7.5 kilometers was to be built by the slab-system, and the remaining 3.7 kilometers by the embankment system. It was also decided that the five stations along the elevated system, including Nada and Takatori, should also be elevated at their respective sites, with the exception of the Sannomiya Station which was to be removed a little to the east, as the Kobe city construction plan required it.

Of these five stations, the freights have been handled at the Kobe and Hyogo Stations. Furthermore, the Kobe Station, being the western terminal of the Tokaido-Sen (Tokyo-Kobe Line), is equipped with yards for making up passenger trains. If the freight handling equipment of these two stations as well as the yards were to be elevated, the work would require an immense sum of money. Consequently, it was decided that the freight sections of the Kobe and Hyogo Stations should be left unelevated and that the yards of the Kobe Station should be removed out of the city, a new location being created between the Akashi and Okubo Stations in the west of Kobe. (The removal of the yards of the Kobe Station was decided on partly in consideration of the fact that it is uneconomical to occupy such spacious ground within the city, and partly because the Kobe city construction plan required it.) The freight section of the Kobe Station, however, was to be remodelled into an independent station to be known as the Minatogawa Station, and it was to be connected with the Higashi-Nada Station by the construction of a new single surface track to be known as the coast line. Meanwhile, the freight section of the Hyogo Station was also to be remodelled in such a manner that it would be connected with the Takatori freight yards by means of a fifth single track to be built on the elevated system.

Other readjustments were also to be carried out side by side with the present construction program. Included among these was the extension of the Shinkawa line of Kobe in such a manner as to join the Wada-Misaki line, linking the Hyogo waterfront with the Kobe Central Market and then eventually connecting with the Takatori Station. The Takatori Station, in the meantime, was to be removed somewhat to the south, and a new freight yard was to be created between the station and the Takatori railway shops.

Construction Program

The readjustment plan having been drawn up, it was decided to put it into effect in the following order: During the first stage of the construction program, the existing lines were to be removed slightly to the sea side without suspending the train operation. An elevated system, spacious enough to hold double tracks, was then to be erected on the mountain side. In the meantime, the Takatori and the Minatogawa Stations (the latter being the freight section of the Kobe station) as well as the Akashi yards and the new coast line were to be constructed. Upon the completion of all this, the surface passenger lines were to be switched over to the elevated system (and this was accomplished on the morning of October 10, 1931).

During the second stage of the construction program, an additional elevated system is to be constructed adjoining the newly built elevated system on its sea side, removing at the same time the surface lines.

The survey was commenced in 1918, followed by the purchase of the land required for the construction work, and the actual work of building was started with the reconstruction of the Takatori Station in 1922. The construction of the elevated system was commenced in August, 1926, beginning with the section between Warizuka and Karumogawa, followed by sections between Kobe and Hyogo, Ikutagawa and Sannomiya, Sannomiya and Kobe. The reconstruction of the Kobe, Hyogo, and the Sannomiya Stations then followed.

The coast line and the Akashi yards were completed in December, 1928, and March, 1930, respectively, and they are now in operation.

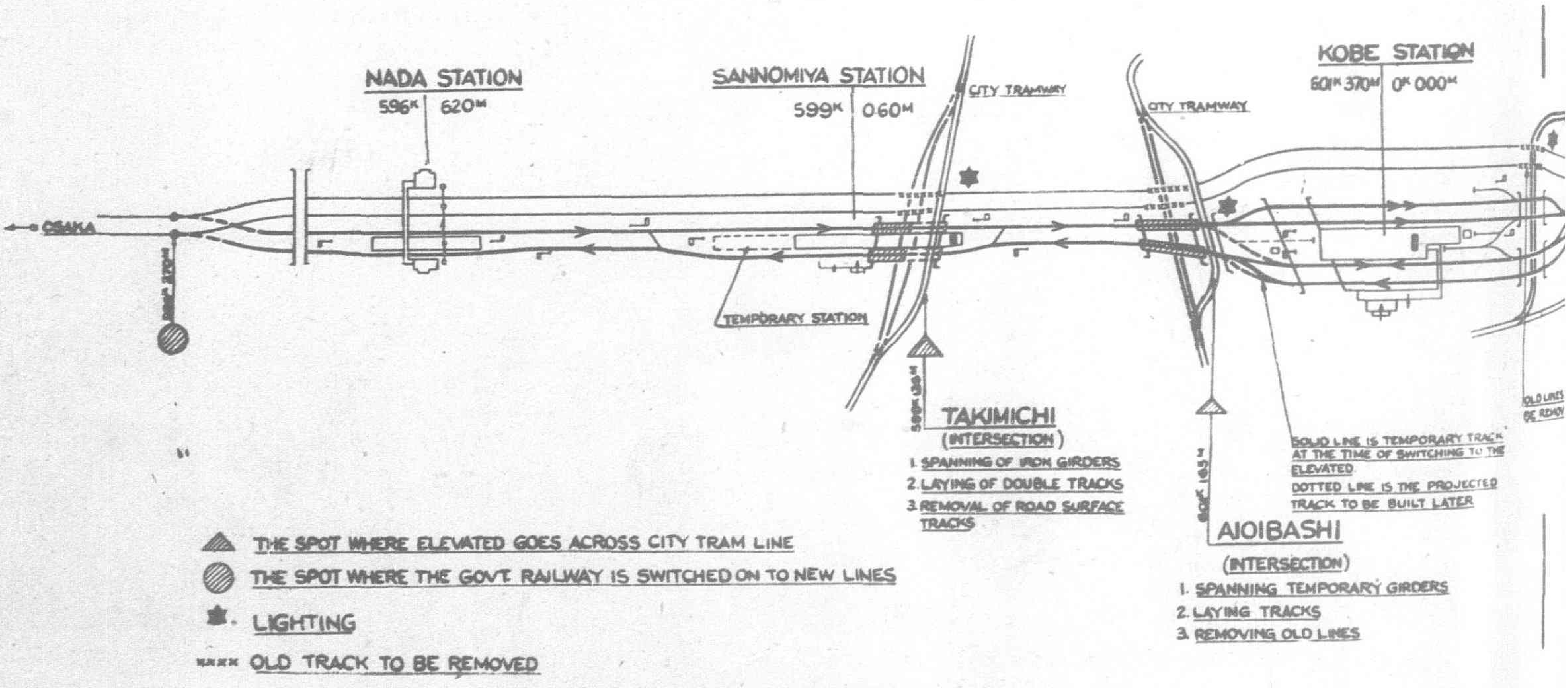
The work made steady progress and all was completed at the beginning of October, 1931, except the four sections where the railway elevated system intersected the elevated lines of the Kobe Municipal tramway at Takimichi, Minatogawa, Aioibashi, and Sugawaramachi. These four sections were completed simultaneously between midnight of October 9 and the morning of October 10, thus marking the completion of the first stage of the construction program. The elevated system was opened on the morning of October 10 with due ceremony.

The first stage of the construction program has thus been accomplished after a period of 13 years since the survey was started; the construction of the elevated system alone has taken five years.

As regards the second stage of the construction program, it is expected to be completed in 1935.

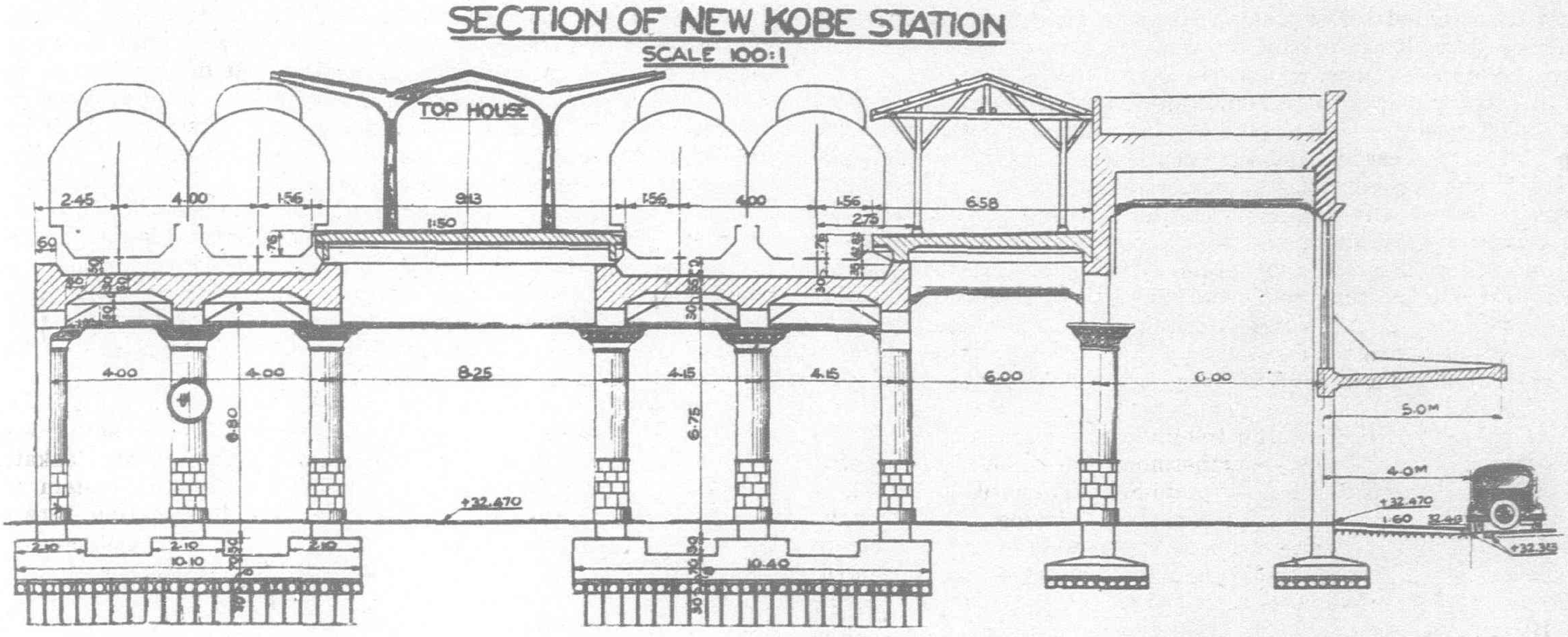
Slab System

For a distance of 7.5 kilometers from the Kobe Steel Works and Karumogawa, the section that constitutes the most active business quarter of the city, the elevated railway is built according to the reinforced concrete slab system, with two and sometimes three posts. This particular system has been adopted in order to utilize the space underneath the elevated railway for opening highways or shops as may be required in the future. It was also



NADA STATION
596K 620M
SANNOMIYA STATION
599K 060M
KOBE STATION
601K 370M 0K 000M
OSAKA
CITY TRAMWAY
CITY TRAMWAY
TEMPORARY STATION
TAKIMICHI
(INTERSECTION)
1. SPANNING OF IRON GIRDERS
2. LAYING OF DOUBLE TRACKS
3. REMOVAL OF ROAD SURFACE TRACKS
AIOIBASHI
(INTERSECTION)
1. SPANNING TEMPORARY GIRDERS
2. LAYING TRACKS
3. REMOVING OLD LINES
SOLID LINE IS TEMPORARY TRACK AT THE TIME OF SWITCHING TO THE ELEVATED
DOTTED LINE IS THE PROJECTED TRACK TO BE BUILT LATER
▲ THE SPOT WHERE ELEVATED GOES ACROSS CITY TRAM LINE
▨ THE SPOT WHERE THE GOVT. RAILWAY IS SWITCHED ON TO NEW LINES
✱ LIGHTING
xxxx OLD TRACK TO BE REMOVED

Map of new elevated system in Kobe



Section of new Kobe Elevated Station

considered, in adopting this plan, that the iron girder system was too noisy while the arch system would allow but smaller space between the piers.

The height of the slab section of Kobe's elevated system varies from 3.5 meters to 8.9 meters, the width being 8.8 meters for the ordinary double track section. In constructing this slab section, a number of methods were adopted, depending on the strength of the ground upon which it was built. Ordinarily, iron sheet piles were driven in to a depth of from 14 to 15 feet in order to protect the adjoining surface railway, but at places where the ground was found to be soft, foundation piles were driven in to a depth of from 18 to 19 feet before the sheet piles were driven. After the sheet piles were put into place, gravel was laid on either side to the width of the ground space of the elevated system, and this was coated with concrete to level the surface. The reinforced concrete slab posts were then erected, each post containing, on the average, 30 steel poles of one-inch diameter each.

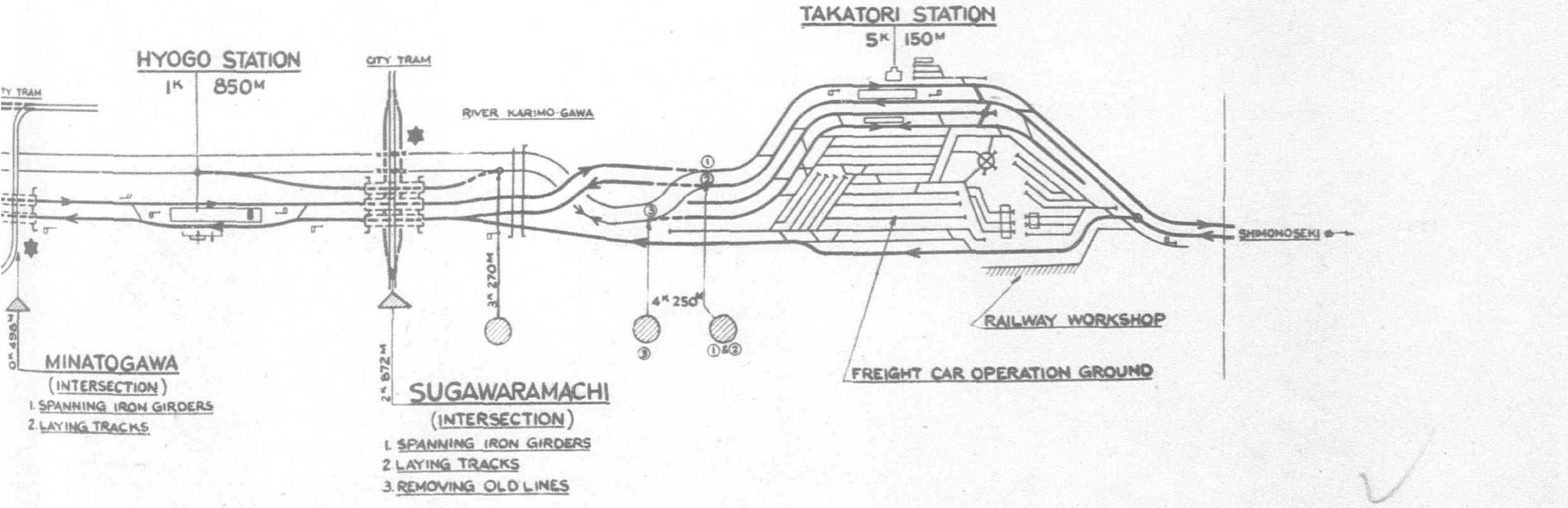
The construction of the embankment system was somewhat easier as compared with the slab system. Two outer concrete walls were erected, and the open space between the walls was filled with sand and earth. The highest part of the embankment section was nine meters in height.

Sixty-four land bridges were built across the streets intersecting the elevated system and elsewhere, though the bridges spanning the Ikutagawa, Karumogawa, and the Tenjogawa (rivers) are not included in this total which aggregates 1,100 meters in length. Of these, 48 had iron girders while the 16 remaining had reinforced concrete bridge-beds. The largest span of these bridges measured 42.1 meters, the smallest being 7.6 meters.

Stations

Of the five stations along the elevated system, the Kobe and Sannomiya Stations are the most important, as they adjoin such active business centers as Motomachi, the Bund, the former foreign settlement, and Shinkaichi. It was a considerably difficult task to squeeze in all the necessary station equipment underneath the elevated system wherever possible.

In building these stations, the railway authorities paid special attention to build few large rooms instead of creating many small rooms, as such have more elasticity in meeting the ebb and flow of the passengers. The ticket office, the wicket, and the luggage room were arranged with the main corridor as their center so that passengers might have no trouble in finding their way about. It was also arranged that the passengers leaving the station would pass through a special exit so that they would not be mingled with those entering to take trains, thus avoiding congestion. The waiting rooms are so placed as to enable travellers to see from where

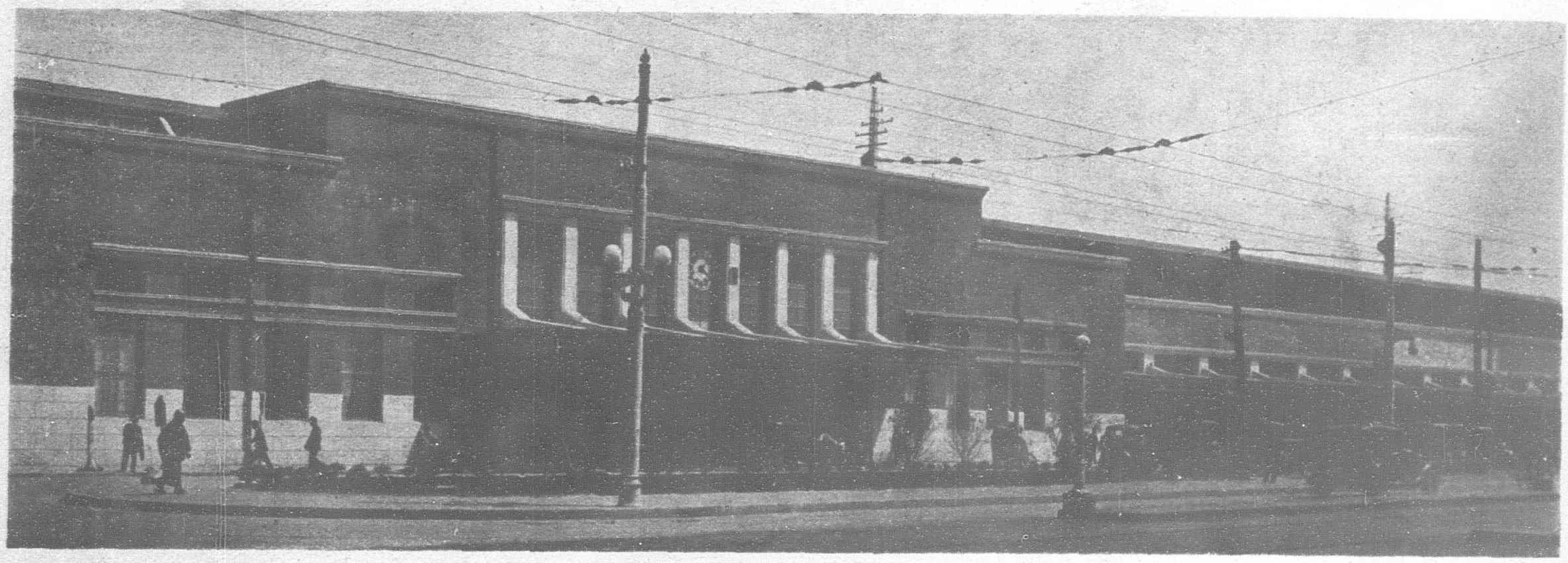


Solving traffic problem of Japanese Port they sit the wicket across the concourse, this in consideration of the fact that travellers are liable to become uneasy about the time when the wicket opens.

All the principal rooms are equipped with heating as well as ventilation systems. Too, economy is exercised as regards the area of the squares in front of these stations and grass plots are to be laid out in such places as will help direct the traffic smoothly. Attention has also been paid to the linking of the stations with the city tramway, motorbus, and taxicab services.

In addition to such minute details, however, there is still room for further elaboration of the whole scheme. This will be completed when the second stage of the construction program has been carried out.

The Sannomiya Station is but half finished at present. It will face the sea upon completion ; at present, only its rear facing the hills is complete. The station is situated at the junction of the projected extension of the Osaka-Kobe National Highway and the proposed highway to run to the waterfront from the hill side of the station (which is provided in the Kobe city construction plan). Moreover, the Osaka-Kobe Electric Railway, locally known as the Hanshin, is now building an underground line to reach the sea side of the main entrance of this station, while the Osaka-Kobe Express Electric Railway, locally known as the Hankyu, has obtained a franchise to extend its present Kobe terminal at Kamitsutsui to the hill side entrance of this station by the elevated

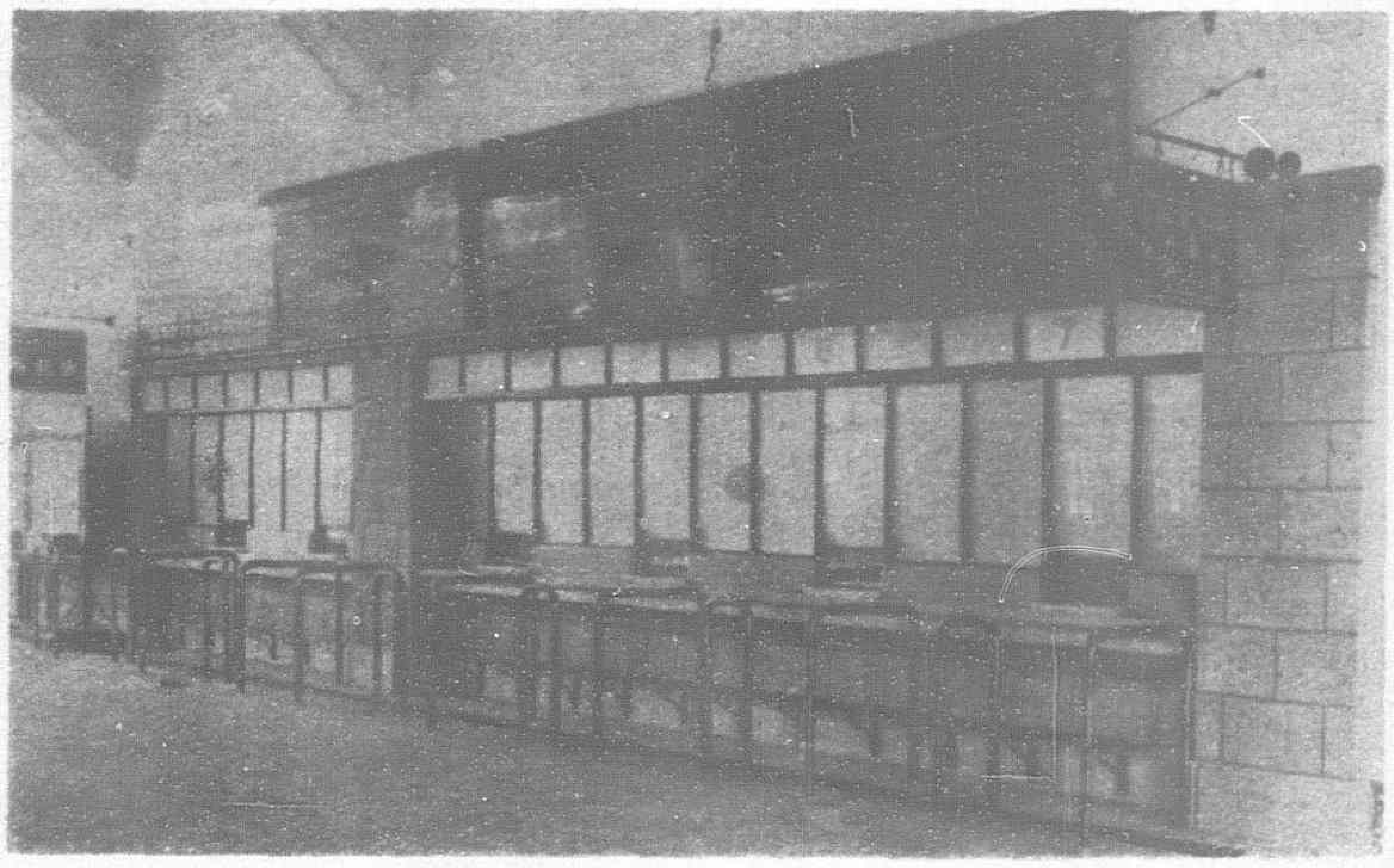


1

Front view of new Kobe station

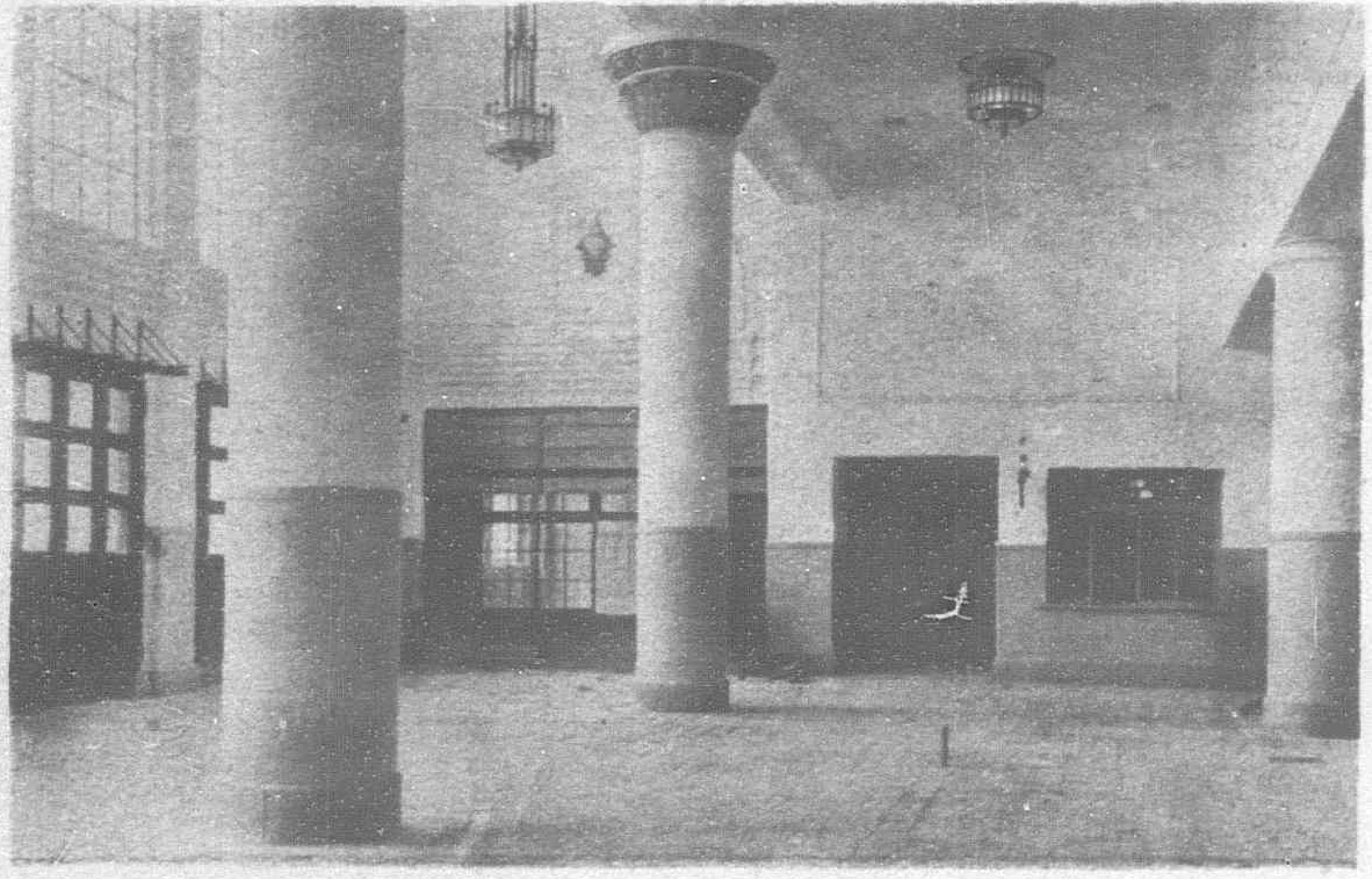
Main entrance of new Kobe station

2



3

Booking office of new Hyogo station



Concourse of new Kobe station

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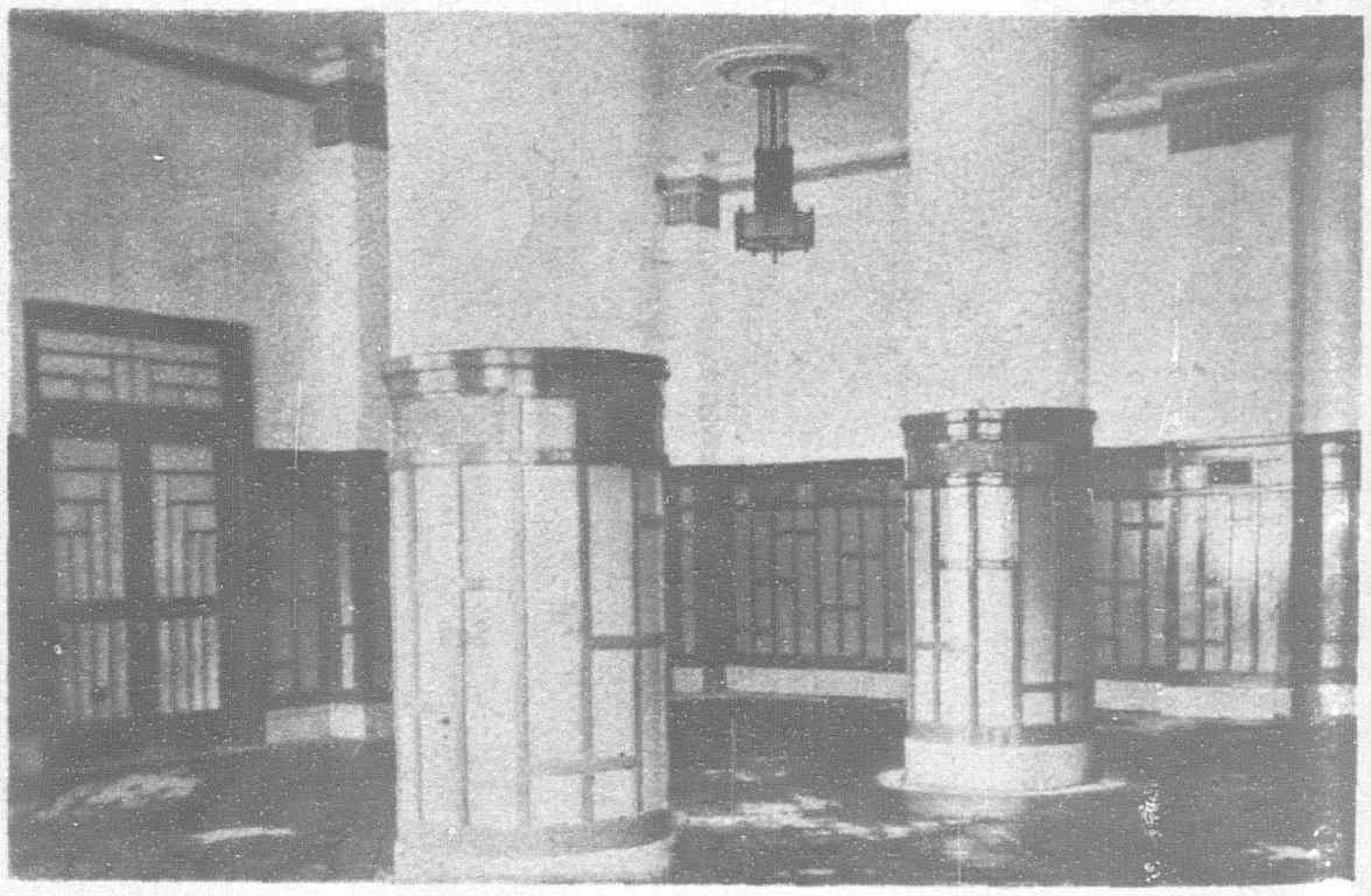


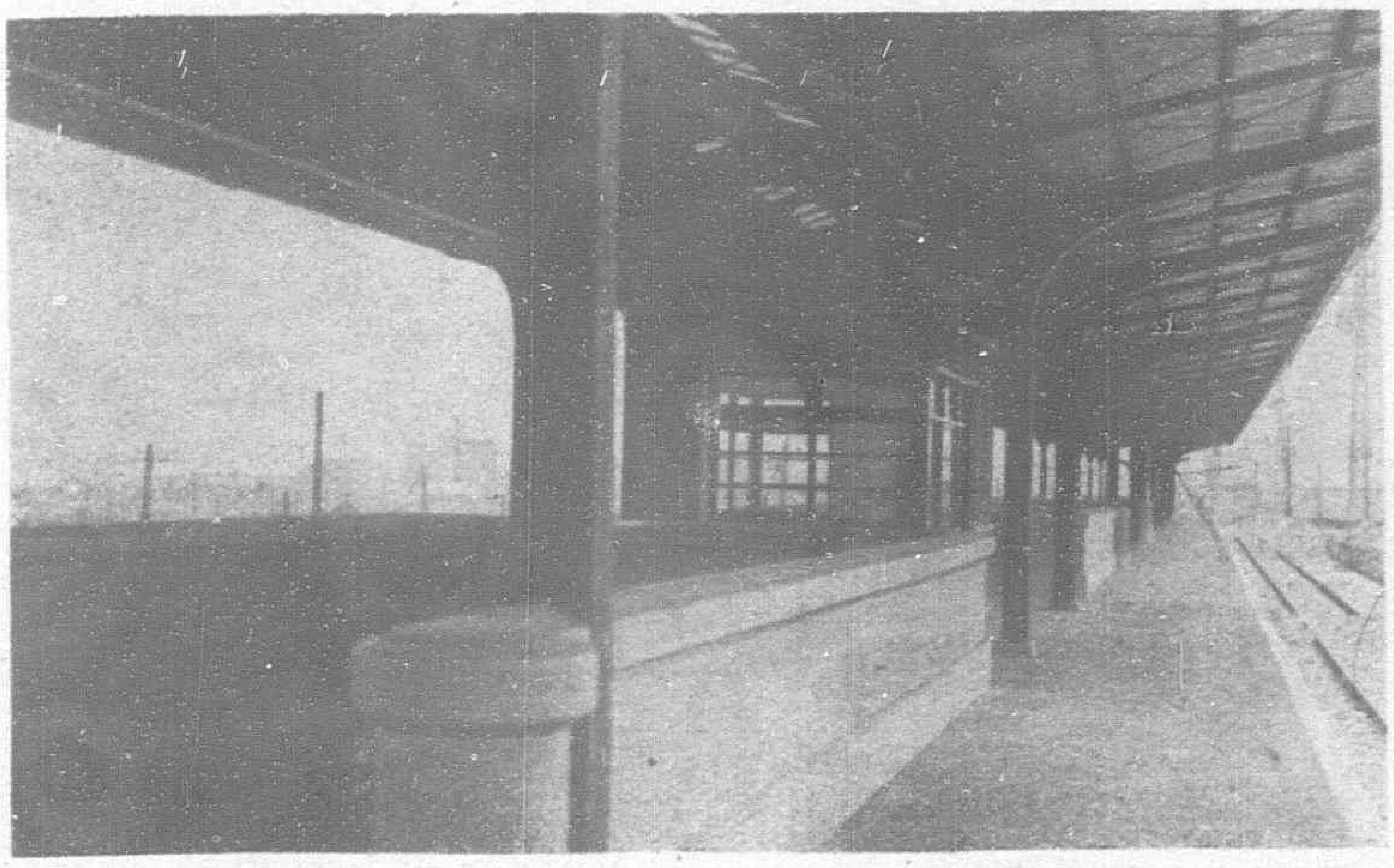
Kobe station first and second class waiting hall just completed

5

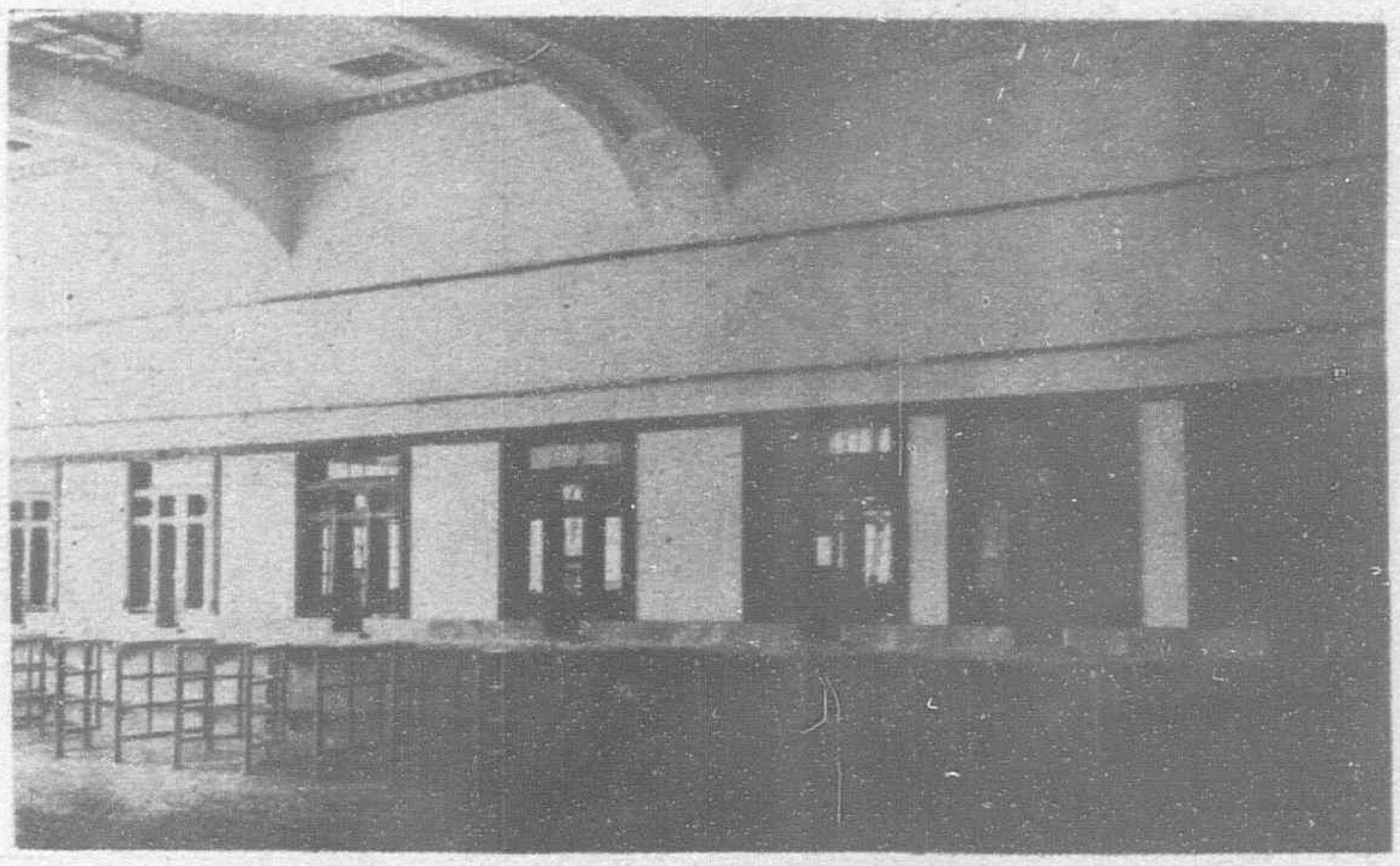
system. Upon completion of all of these projected highways and underground and elevated railways, Sannomiya will become the traffic center of Kobe. It is with this in view that the station site allows sufficient area to build a spacious concourse both for entrance and exit, as well as waiting-rooms.

The Kobe Station, too, will have entrances and exits on both sides of the tracks, although the hill side will be made the front, the city tramways and motorbuses passing the square on this side. It is expected, however, that the number of passengers to board and leave the trains here will be smaller than at the Sannomiya Station.

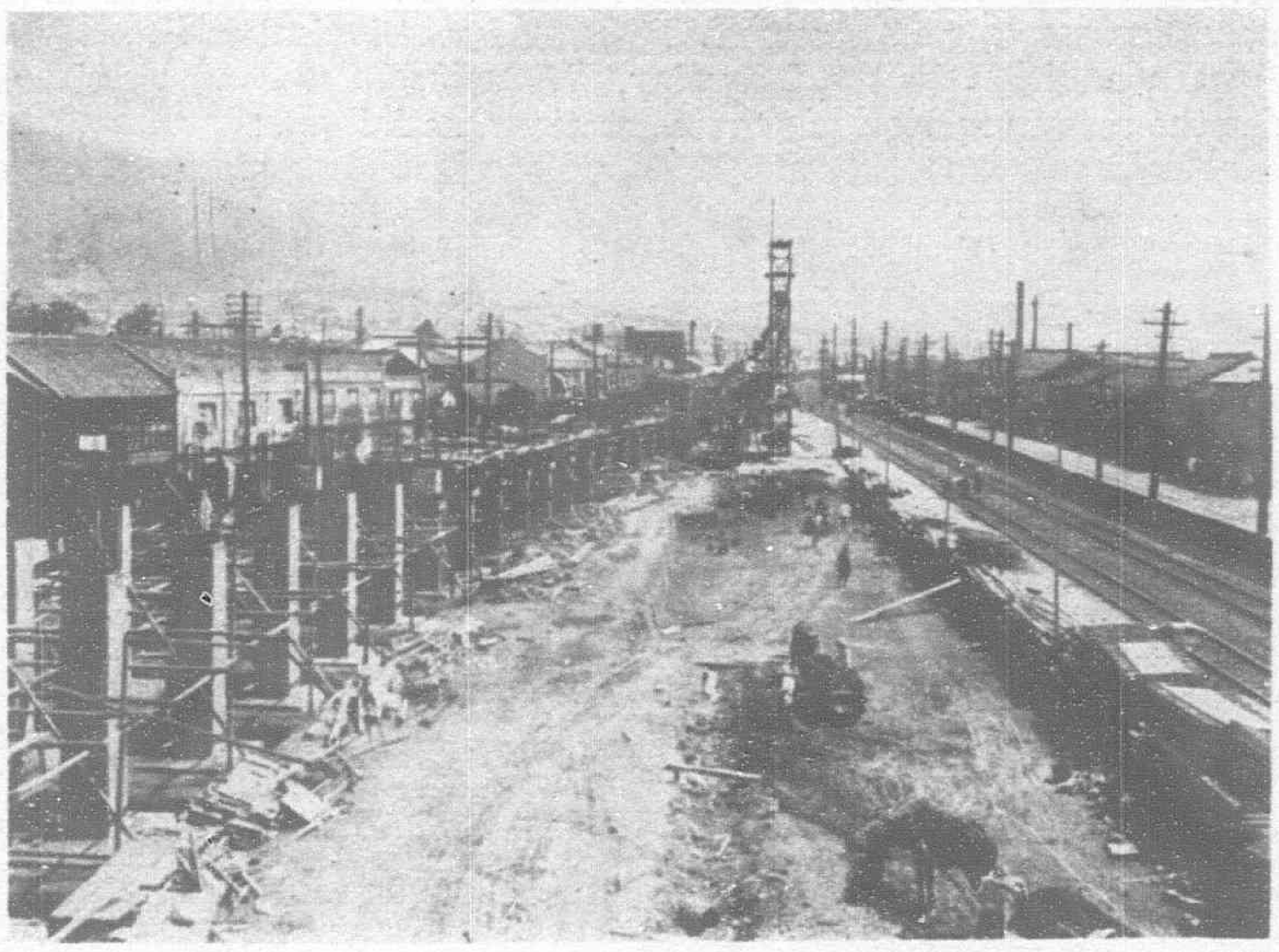
Simplicity is the feature of the Hyogo Station which will be used mainly by office workers. The general scale of the station is much smaller as compared with the Sannomiya and the Kobe Stations. A rear station is to be built on the sea side, and this will be connected with the front station by means of underground passages.



1 Platform of new Sannomiya station

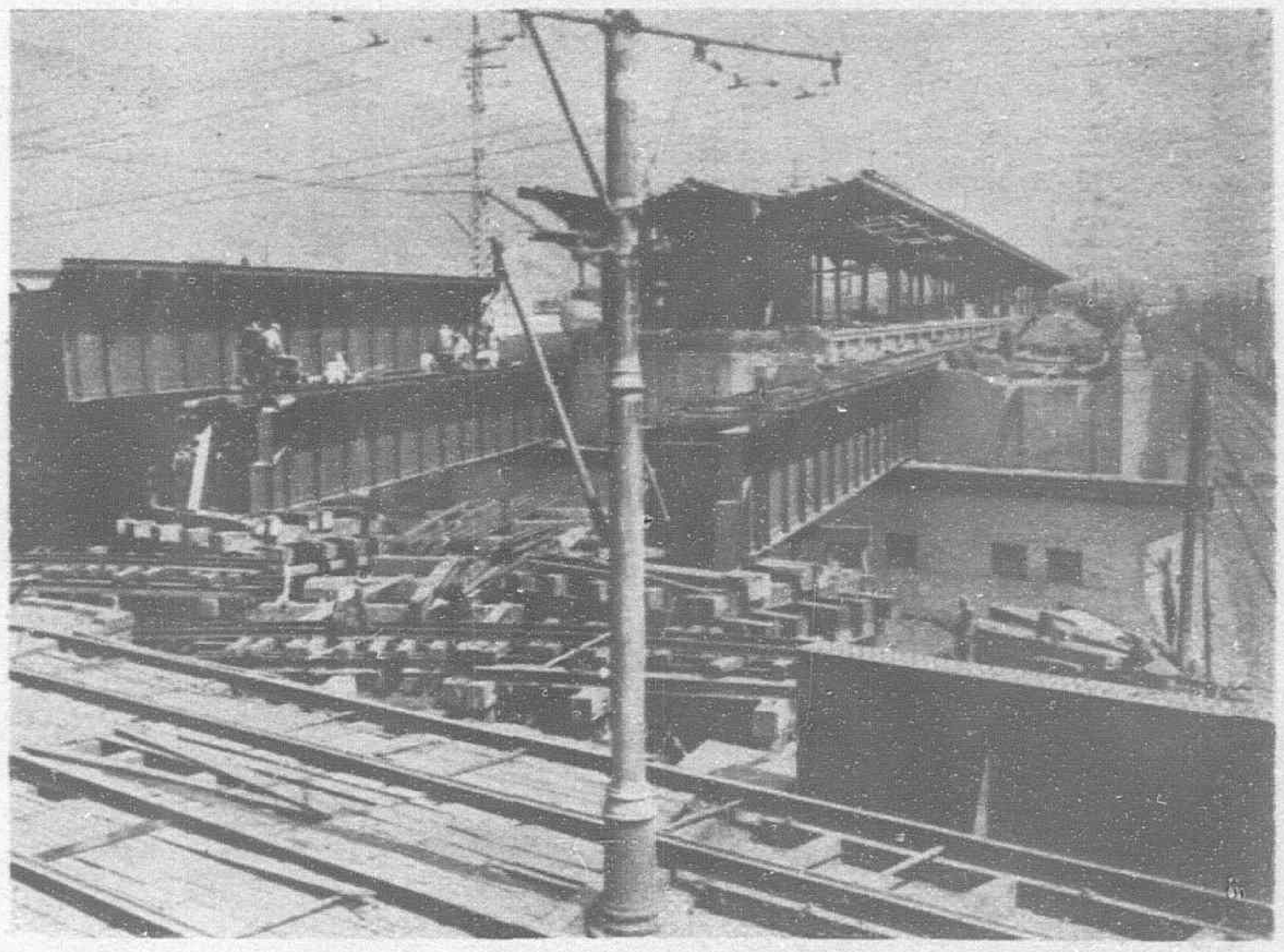


2 Booking office of new Sannomiya station

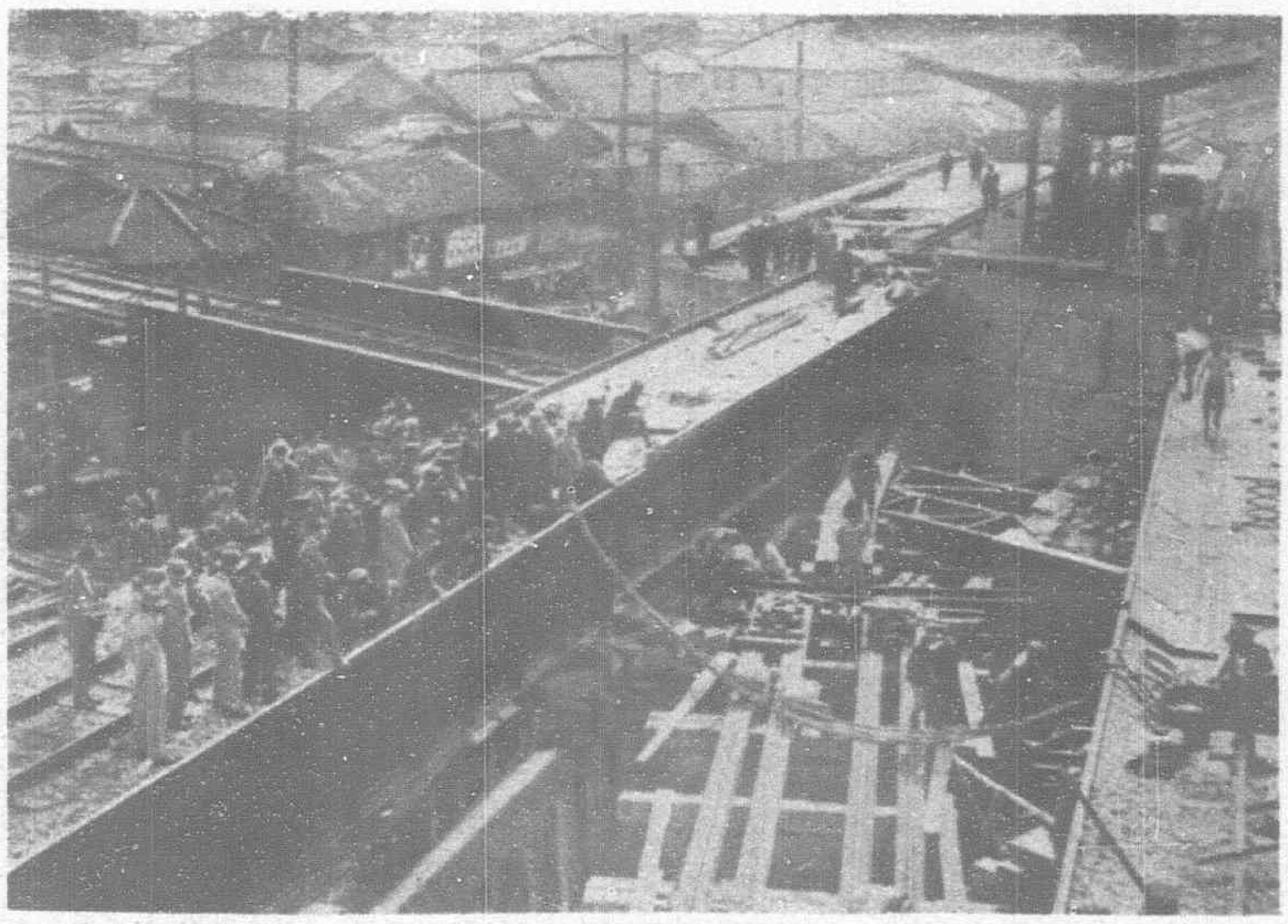


Slab work of elevated system under construction

3

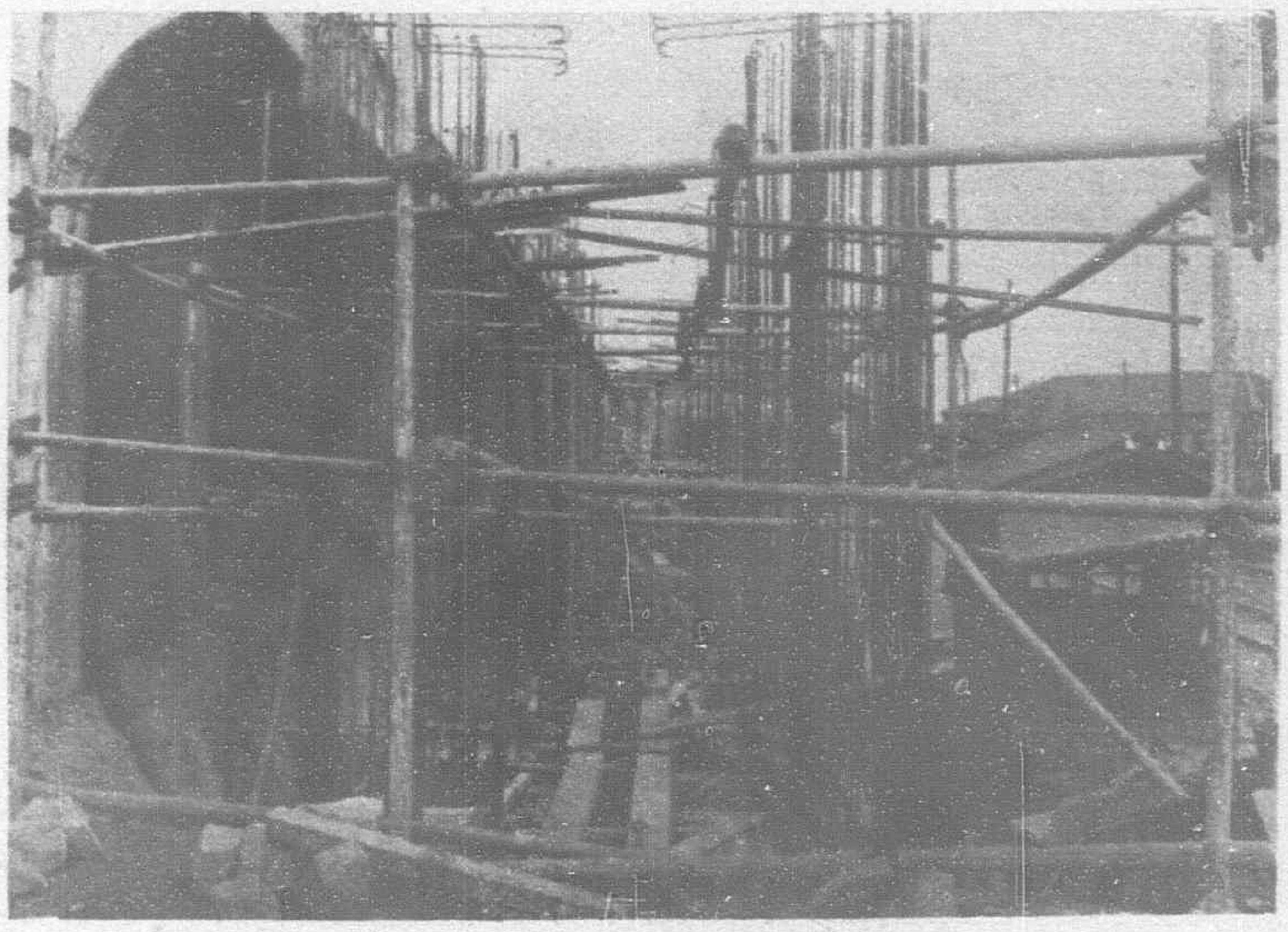


4 Takimichi section, work consisting of spanning iron girders and laying tracks at point of intersection with elevated line of Kobe tramways



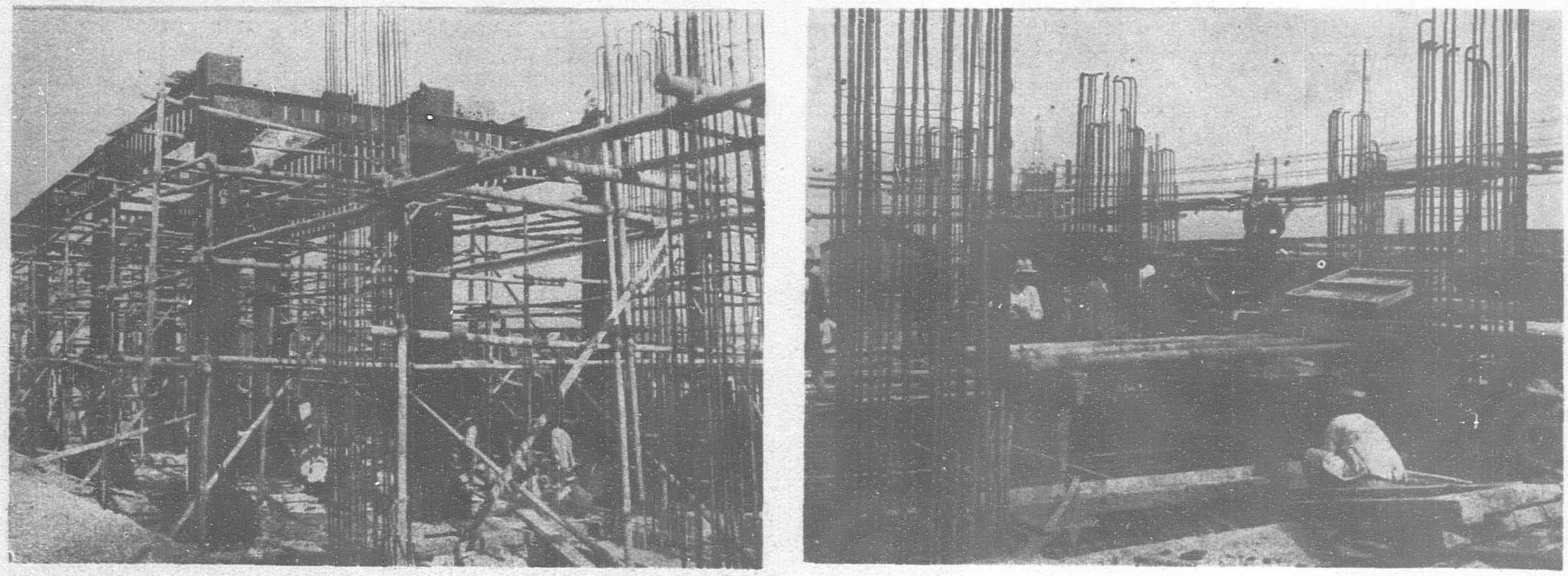
Takimichi section on October 10 when girders were spanned over elevated system of city tramways

5



Slab work under construction

6



Frame work of new Kobe station

The Nada and the Takatori Stations at either end of the elevated system are ordinary way stations where office workers make up the majority of the passengers.

The figures for the ground space to be occupied by these stations are as follows: (Unit: square meter)

Stations	*Ground Space*
Kobe	10,370
Sannomiya	8,450
Hyogo	5,000
Nada	650
Takatori	280

The area of the squares in front of these stations is as follows: (Unit: tsubo; one tsubo is six feet by six feet, or 1,200 tsubo is about an acre.)

Stations	*Front*	*Rear*
Kobe	2,739	3,315
Sannomiya	1,996	1,219
Hyogo	1,041	—

The area of the grass plots to be laid out in the squares of these stations is as follows: (Unit: tsubo)

Stations	*Front*	*Rear*
Kobe	160	275
Sannomiya	925	255
Hyogo	118	—

Expenditures

The entire cost of construction amounts to Y.38,000,000. Out of this, the first stage of the construction program has been accomplished at the expenditure of Y.29,000,000, this including Y.9,300,000 spent for purchase of land, Y.18,700,000 for construction work, and about Y.1,000,000 for electrical projects.

In addition to the foregoing, Y.17,866,000 was appropriated for the reconstruction of the five stations, as follows:

Stations	*Expenditures* (*Yen*)
Kobe	6,510,000
Sannomiya	4,550,000
Hyogo	3,800,000
Takatori	2,400,000
Nada	606,000

The number of manual workers employed in the construction work of the first stage of the program was equivalent to the employment of 1,500,000 men per day. The volume of the cement consumed was 550,000 barrels; the iron girders totalled 3,000 tons; the iron building materials, 25,000 tons; the sand and gravel for concrete, 44,000 cubic tsubo and the gravel to lay on the tracks reached 1,400 cubic tsubo.

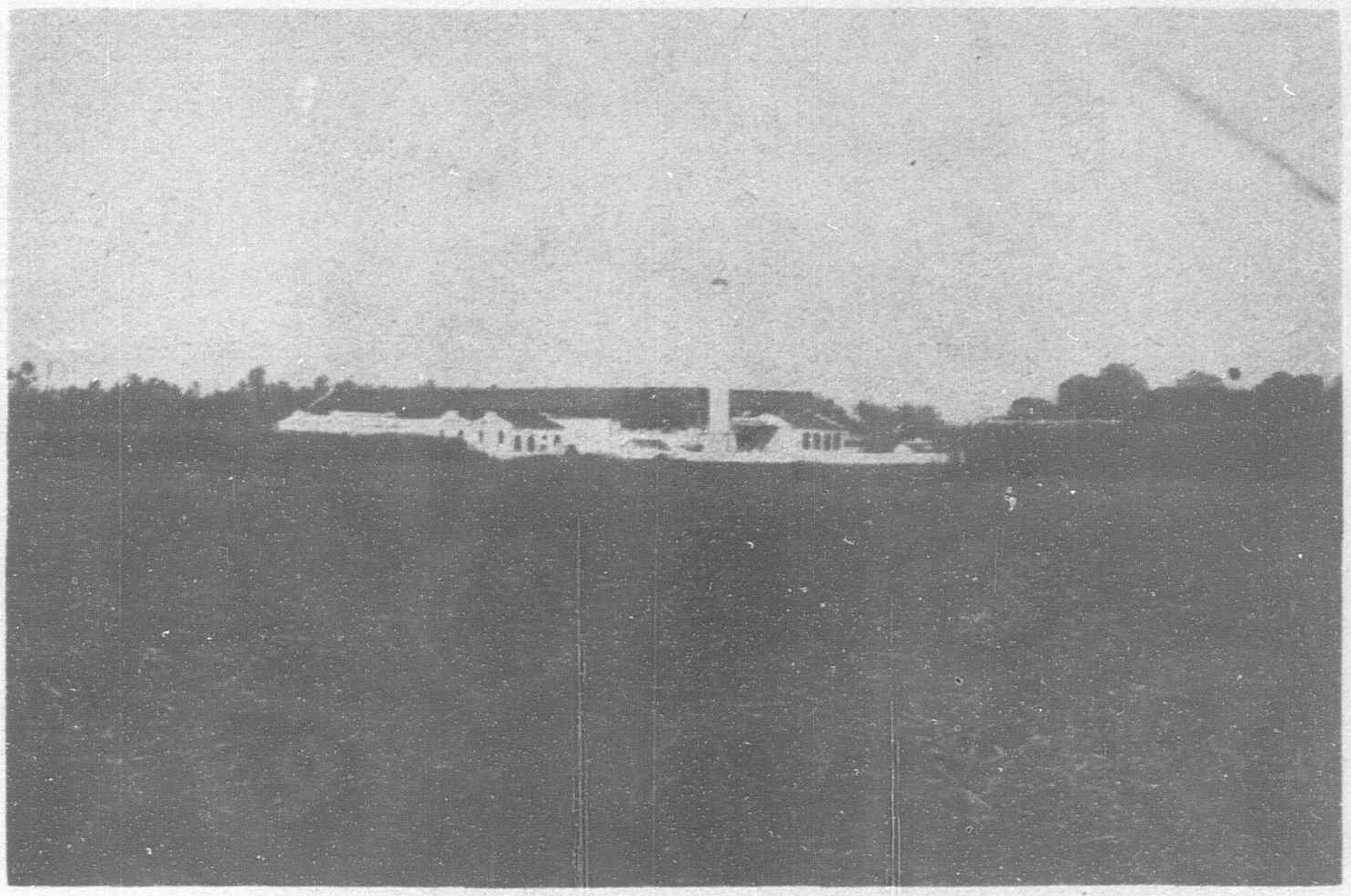
Market in Malaya

One of the most attractive features of the market for domestic electrical appliances in British Malaya is its consistency. Unlike other branches of the electrical trade, buying remains fairly steady at all periods of the year, and the financial stability of the majority of purchasers causes importers few qualms so far as bad debts and long credits are concerned. The reason for the local business man's complacency can be readily understood when it is seen that purchases of cooking and heating apparatus are chiefly confined to the Electrical Department of the Federated Malay States at Kuala Lumpur, the capital, and the Municipalities of Singapore and Penang, for, by reason of the official endeavor to popularize the use of electricity, a steady stream of orders is assured. But why should the trade be dependent solely upon the official demand? The fact that they have recently made little or no attempt to extend their connections lays importers open to doubts concerning their enterprise. True, the prevailing economic depression is not exactly an incentive to a serious effort to widen the market, but, on the other hand, it emphatically does not excuse an inactive attitude.

In some instances, of course, it is impossible for importers to do other than stay closely by the requirements of the Municipalities. This is the case with regard to large and expensive equipment, such as cooking stoves and bath-water heaters, which users are naturally loth to buy outright when they can be obtained from official sources at a small weekly or monthly rental. But is there any reason why the same selling procedure should be followed in respect of smaller and less costly appliances, such as toasters, coffee percolators, porridge boilers, saucepans, kettles, warming plates and irons? At present, only the Europeans and Eurasians, numbering roughly 35,000, can be said to have a proper appreciation of the value of these labor-saving devices, but it is not wholly their style and scale of living that has occasioned this. Rather would it appear that theirs are the only communities in which the sale of up-to-date domestic equipment has been deemed worth while—a ridiculous idea if the buying strength of the Chinese population is given serious consideration.

Almost as numerous as the Malays, who number 1,675,000, a very large proportion of Chinese in Singapore, Penang and other of the larger cities are fully able to afford the cost of modern domestic appliances and utensils, and, what is more, they usually live in residences every room of which is electrically equipped. It is not on account of the strength of foreign competition that a closer attention to the Chinese demand is recommended.

All-electric Raw Sugar Factory at Kedawoeng, Java



Kedawoeng Sugar Factory, Java

THE superiority of the electric drive for sugar mill auxiliaries including pumps, megasse or cane conveyors, centrifugal extractors, fans, etc. is now firmly established, and the general presence in the factory of drip-water and steam (inseparable from many of the processes) explains the marked preference for induction motors in this application. The induction motor represents by far the simplest and most rugged driving unit obtainable.

For crusher and mill drives, the steam engine has enjoyed unchallenged popularity for many years, which is partly attributable to the extensive use of exhaust steam for heating and evaporating purposes, but no less to the characteristic effect of the flywheel in balancing the rapidly fluctuating nature of the load. It is becoming increasingly evident, however, that in this sphere also, the electric motor can be readily applied, and is in fact already threatening to displace the steam engine completely. The electric motor requires only a fraction of the space necessary for an equivalent steam unit and this, together with the absence of flywheels, immediately ensures a marked increase in accessibility to the mills. Moreover the elimination of live-steam pipes from the mill house introduces other important advantages, among which a less obstructed view and a more agreeable working temperature for the operatives are not the least attractive.

For mill drives, however, the direct-current motor is definitely the most suitable, mainly on account of its convenient speed regulation without losses, which enables the milling speed to be adjusted very exactly to the load.

In order therefore to exploit the respective advantages of both types of motor, modern sugar factories are finding it necessary to provide both AC and DC supplies. This presents no technical difficulties, and has proved in practice to be both reliable and economical. With new factories, the dual supply would automatically be provided for at the outset, the installation comprising a turbo-driven alternator direct coupled to an appropriate DC generator. Existing factories, however, which desire to dispense with steam-power in favor of the electric drive for cane mills, are generally already equipped with an AC power-station, which can be duly extended to provide the necessary DC.

A change-over of this nature was carried out at the Kedawoeng Sugar Factory, Java, in 1929 (Fig. 1). For many years the cane mills had been driven by reciprocating steam engines and a 300 kva. AC power-station had also been added to supply the electrically driven auxiliaries.

The opportunity was taken at the same time to extend the existing pump installation, for which 3-phase AC was considered advisable in view of the distance between the pumps and the power-station. It was finally decided to install a 1,000 kva, 3-phase turbo-alternator set, adequate for all mills, pumps and other gear—and to provide a rotary convertor to produce the necessary DC for the actual mill motors. The original 3-phase set was retained as reserve.

The specification called for a speed regulation of the four three-roller crushers exceeding the ratio 1: 2, this operation to be controlled partly, for the four crusher motors simultaneously from the power house switch-board, and partly for each motor individually. The latter are therefore designed for an armature voltage variable between 255 and 475-volts, the 500 kw. rotary convertor illustrated in Fig. 3 being available to effect the necessary voltage control. A tapped transformer on the AC side of the convertor provides a voltage range of 202-308-volts at the slip-rings, and also serves to start-up the machine.

The speed control of the individual motors is performed by means of shunt regulators. The total speed range of the main crusher motor is from 410-1,060 r.p.m., and at the remaining three mills from 220-580 r.p.m. A 140-260 h.p. motor is provided for the crusher (the most heavily loaded unit), the other motors being rated at 85-150 h.p. All the mill-motors are drip-proof, and coupled to the mills by means of helical gears (Fig. 4).

Fig. 5 shows the switch-board, from which the rotary convertor is controlled and the collective motor speed control effected.

The individual motors are controlled from a raised gallery in the mill house from which the mills can be easily observed.

The rotary convertor exerts an extremely favorable influence on the power-factor of the mains, which exceeds .85 in spite of the comparatively large number of small motors connected.

Special recorders have been installed, which enable the mills to be accurately controlled to give the maximum yield.

The increased efficiency of the factory has amply justified the changes and extensions. Whereas previously large quantities of fuel were purchased every season for steam raising, etc., the total energy supply for both power and heating can now be derived from the bagasse. This has resulted in simplified supervision and enabled a reduction in staff.

The electrical installation was supplied by Messrs. Siemens-Schuckert, Berlin, and has already given proof of its efficiency during two seasons of continuous, and in all respects satisfactory service.

New Portland Cement Plant

EDGAR ALLEN & COMPANY LTD., Imperial Steel Works, Sheffield, have received a contract from Messrs. Cement Industries Limited, for the supply and erection of a complete Portland Cement Plant which will be situated at Asheham, near Lewes, Sussex. The factory is designed for an ultimate capacity of 180,000 tons per annum and will comprise three units of 60,000 tons, the first of which is now being installed.

The raw materials of which the Cement Company possess almost unlimited quantities comprise the well-known Grey Chalk and Marl, and the factory will operate on the Thick Slurry System. Transport of all incoming and outgoing materials is available by road, rail and water, and electric power will be supplied from the Grid System of the Central Electricity Board through the Ringmer Electricity Co., Ltd.

The factory will concentrate on the production of Rapid Hardening Cement and will be equipped with the most modern plant such as the Recuperator Type Rotary Kiln, the Rexman Balanced Rod Mills and the Fuller-Kinyon Cement Conveying equipment, etc. In addition, a Schulthess Lime Hydrating Plant is being installed in connection with the existing Lime Plant which is being enlarged.

ALL-ELECTRIC RAW SUGAR FACTORY AT KEDAWOENG, JAVA

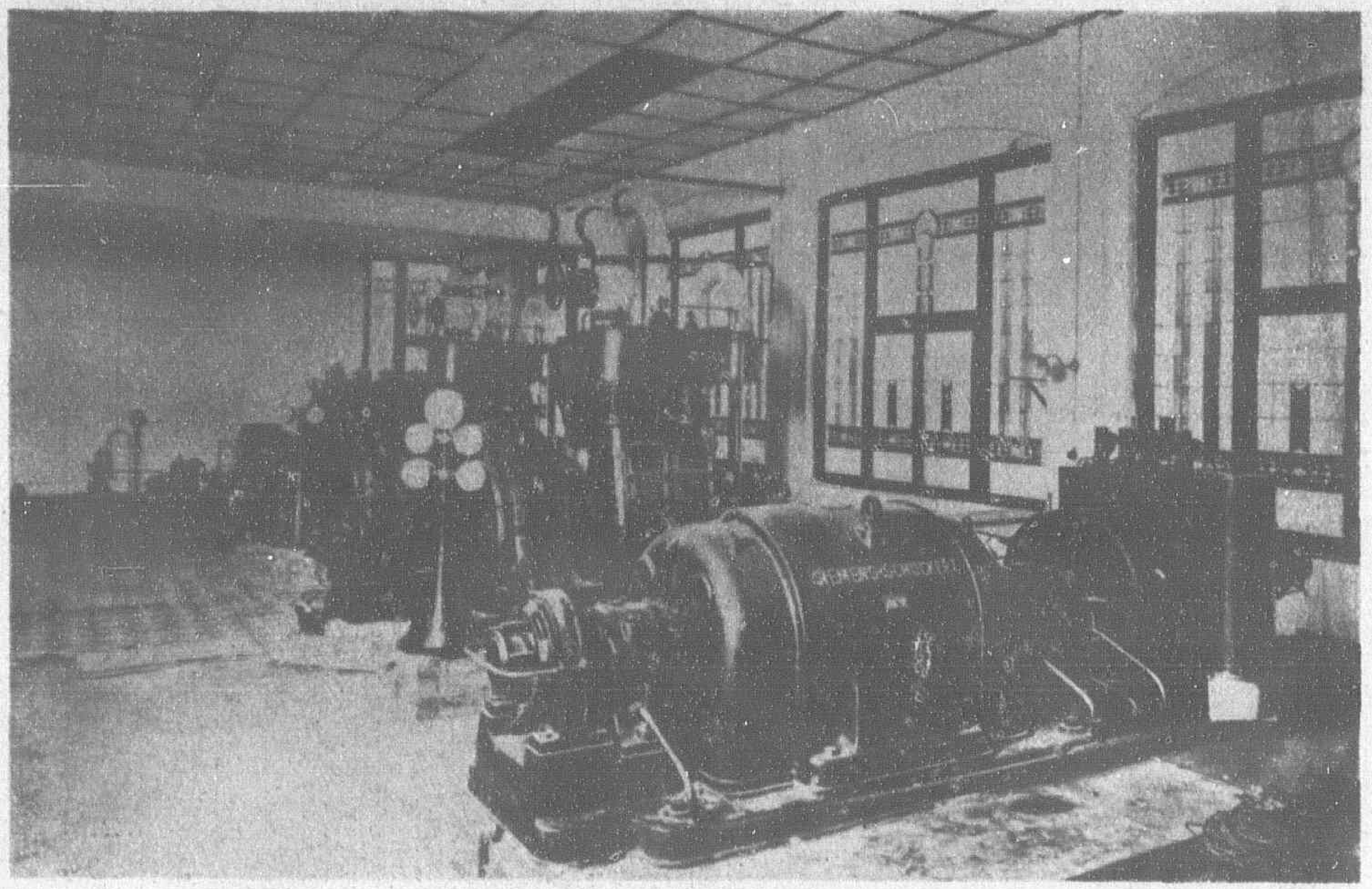


Fig. 2.—1,000 kva, 3-Phase Siemens-Schuckert Turbo-Alternator Set

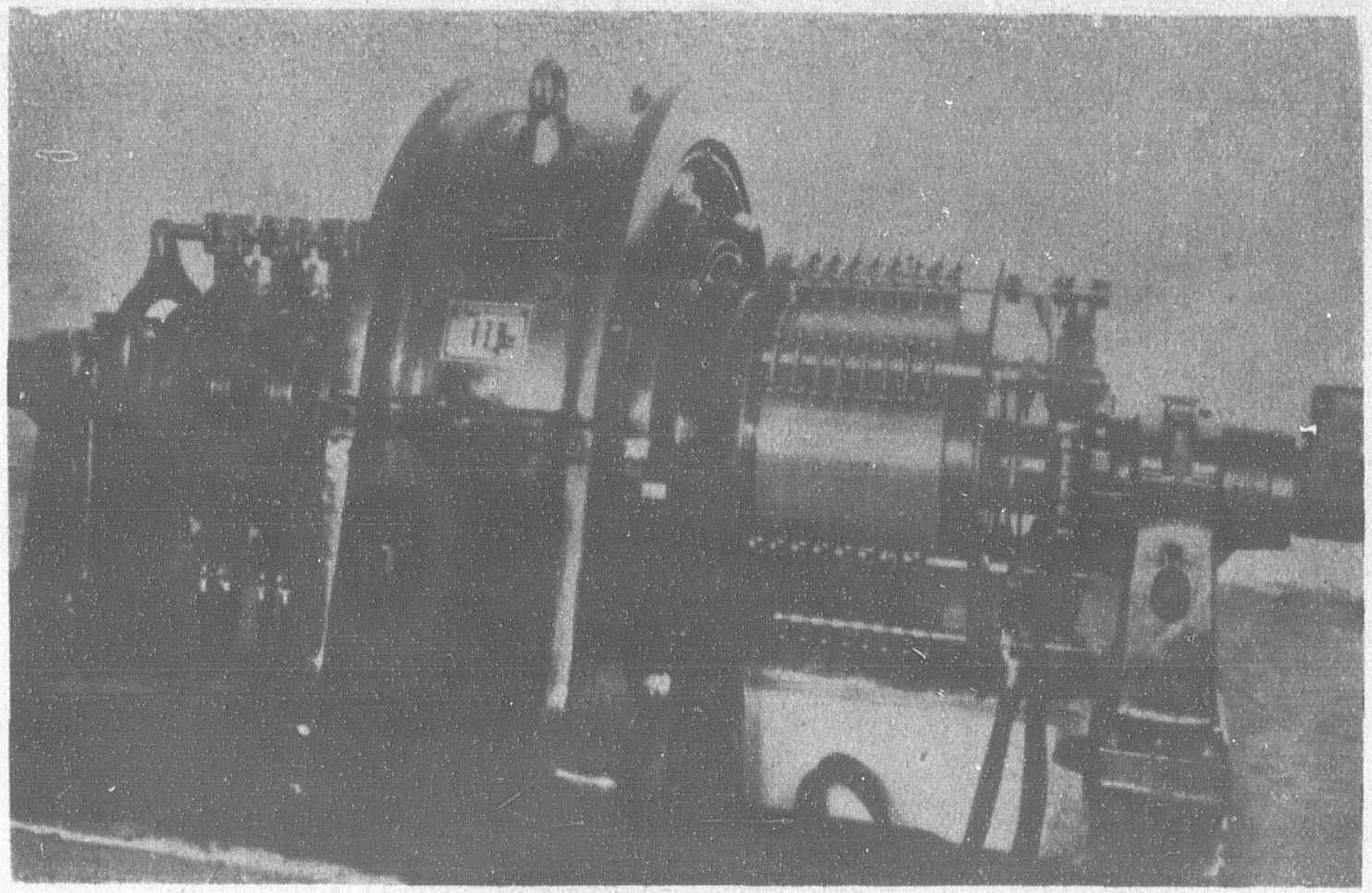


Fig. 3.—500 kw Rotary Convertor

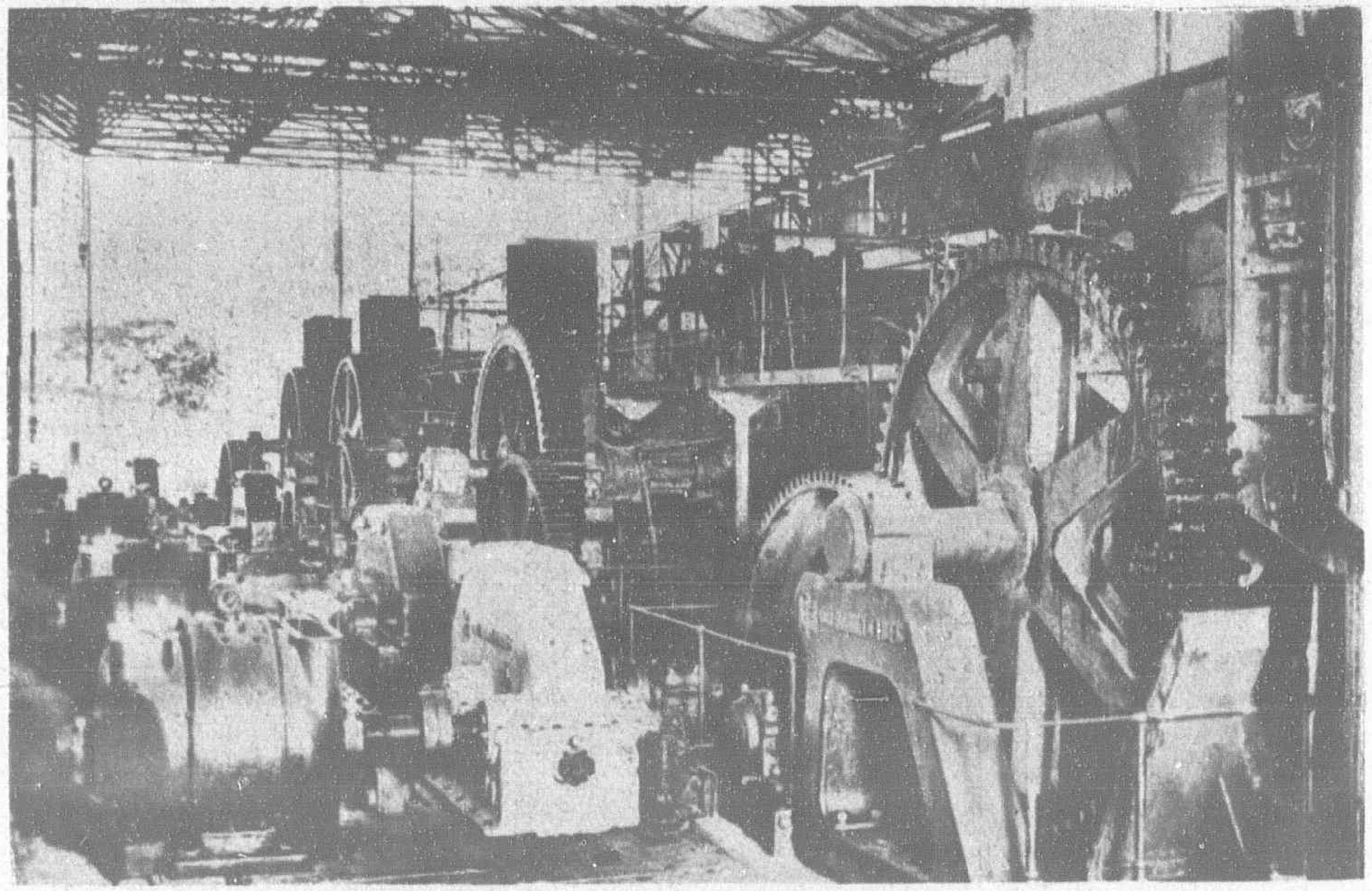


Fig. 4.—Three Crushing Mills coupled to Motors by means of helical gears

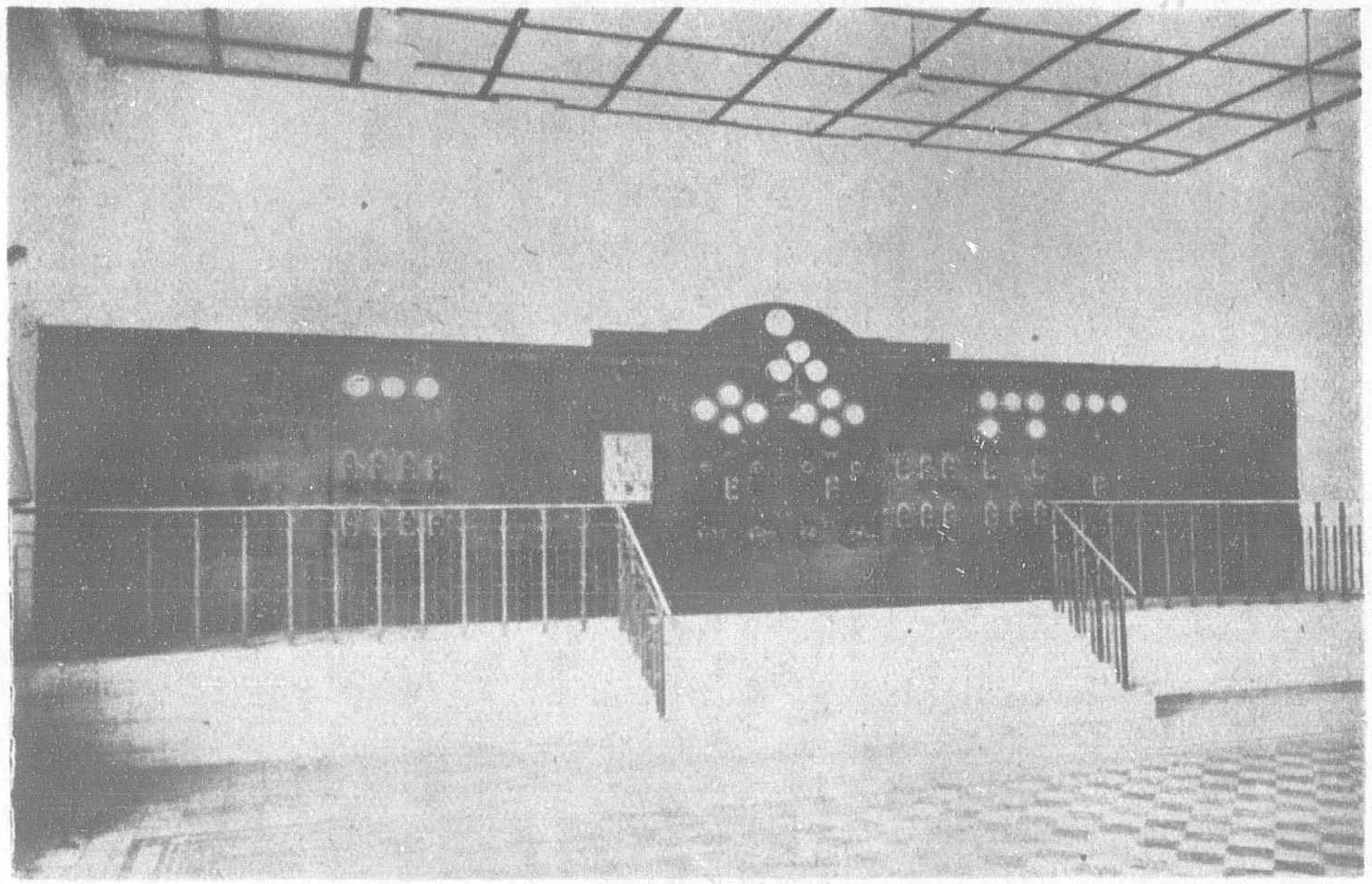


Fig. 5.—Switch-board

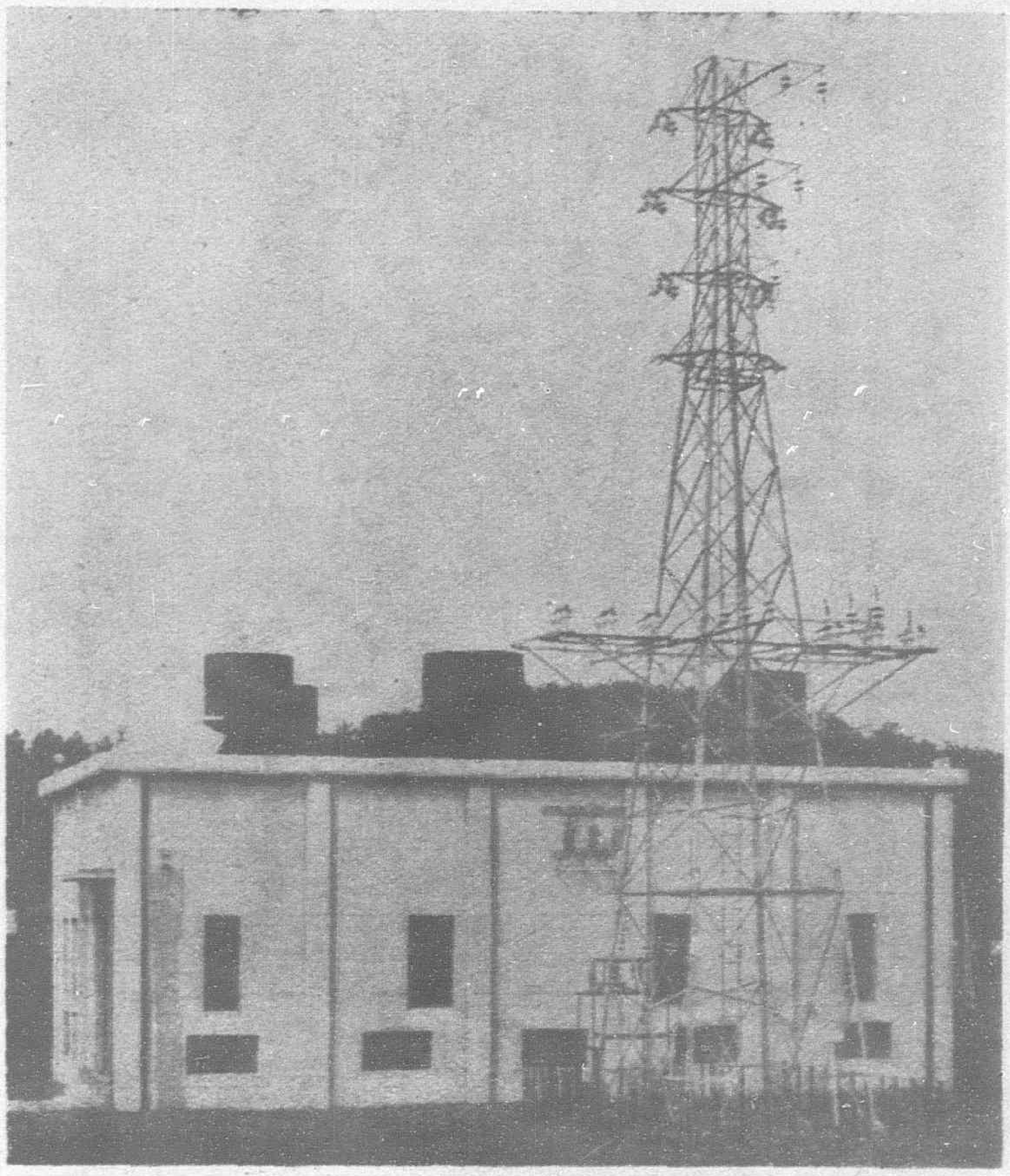
Substation Practice in Japan*

Particulars of One of Numerous Automatic Installations Supplied by British Engineers for Service in all parts of the World

A REPRESENTATIVE example of up-to-date British equipment operating in the Far East may be seen at the Ise Electric Railway, one of the private transportation systems in Japan which is rapidly developing. When completed, the double track of this 3-ft. 6-in. gauge line will extend from Nagoya to Yamada, which are some 68 route miles apart, through important industrial and agricultural centers which necessitate economic and rapid transport for their full development. The new line is fed with a h.t. supply, 3 phase, 60 periods, 11,000 volts, which is transmitted through overhead line by the Toho Power Company.

Complete electrical equipment for the three automatic substations of this Ise Electric Railway was manufactured by the English Electric Co., Ltd., at Stafford, the gear in the Heta substation being typical of that supplied for the other two. This Heta station, which is about half-way between Nagoya city and Yamada, at present supplied some 21 miles of single and double track through three feeders. The sub-station is situated close to the track, and converts the incoming a.c. power, to a 1,500-volt direct-current traction supply, by means of two pairs of series-connected rotary-converters having a total capacity of 4,000 kw. Each converter is equipped with tap starting, roller bearings of special design, a direct-coupled exciter, overspeed and no-start devices, and bearing thermostats. A transformer of the double-secondary type supplies each pair of converters, and for the control of the incoming h.t. supply a sheet-steel truck-type switchboard is provided.

The installation includes control apparatus for complete automatic operation, a special feature being a semi-circular desk from which the working of the equipment may, if desired, be controlled by push-button. The direct-current switching equipment is erected on a gallery and includes two 2,000-amp. contactors and four 2,000-amp. high-speed circuit-breakers, the d.c. meters and the breaker controls being mounted on a desk control-board along with the master time-switch and start and stop push-buttons. The automatic equipment for each converter is grouped on a frame-work, the back of which is shown immediately behind the machine in the accompanying illustration of the interior of the Heta substation. Each machine has its own camshaft controller, which performs the operation of starting on tap voltage and eventually of synchronizing. The transformers are controlled on the h.t. side by motor-operated oil-breakers, the supply to which is controlled by a motor-operated incoming feeder oil-breaker. Once this latter breaker is closed the station is ready for starting.

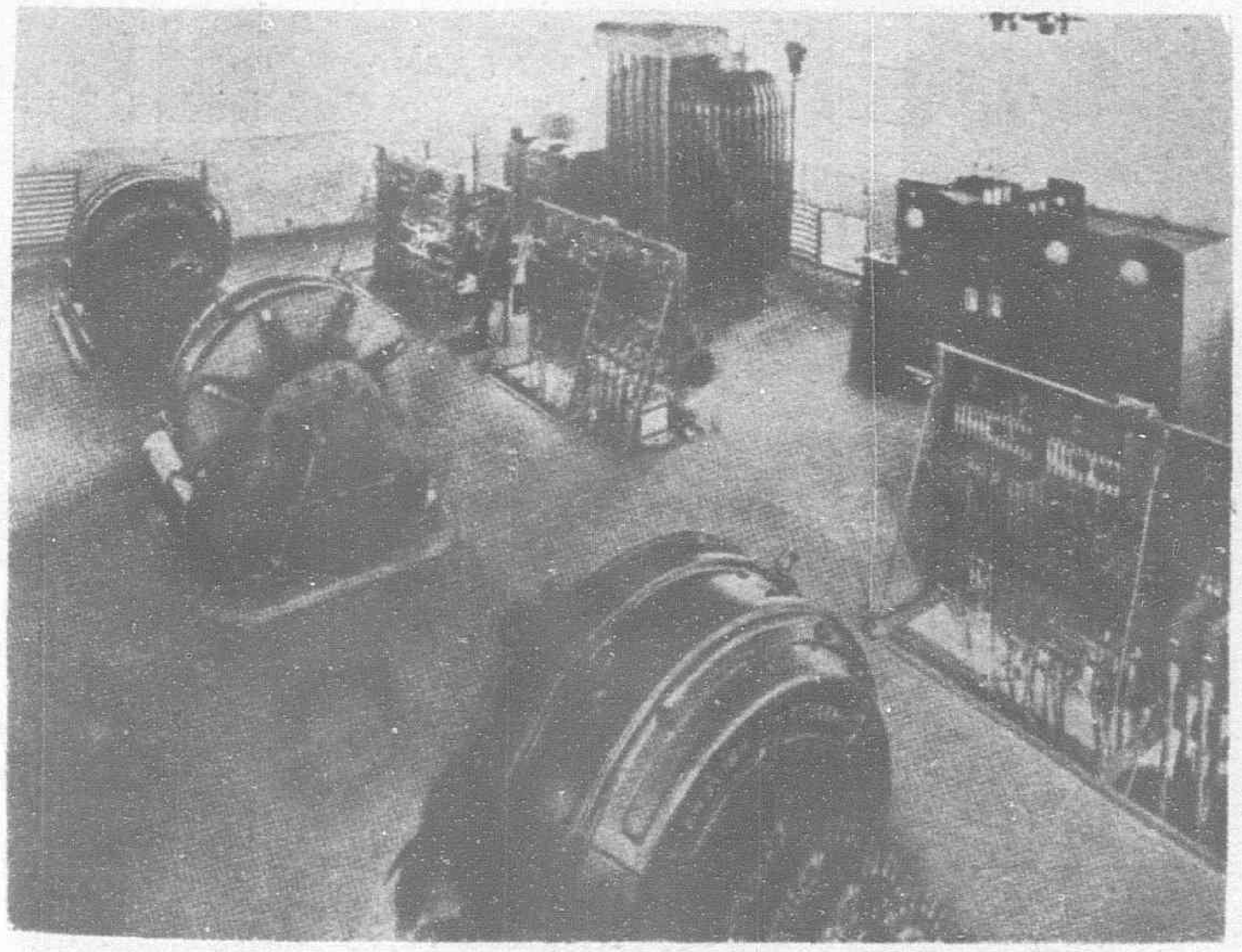


Heta automatic substation on Ise electric railway

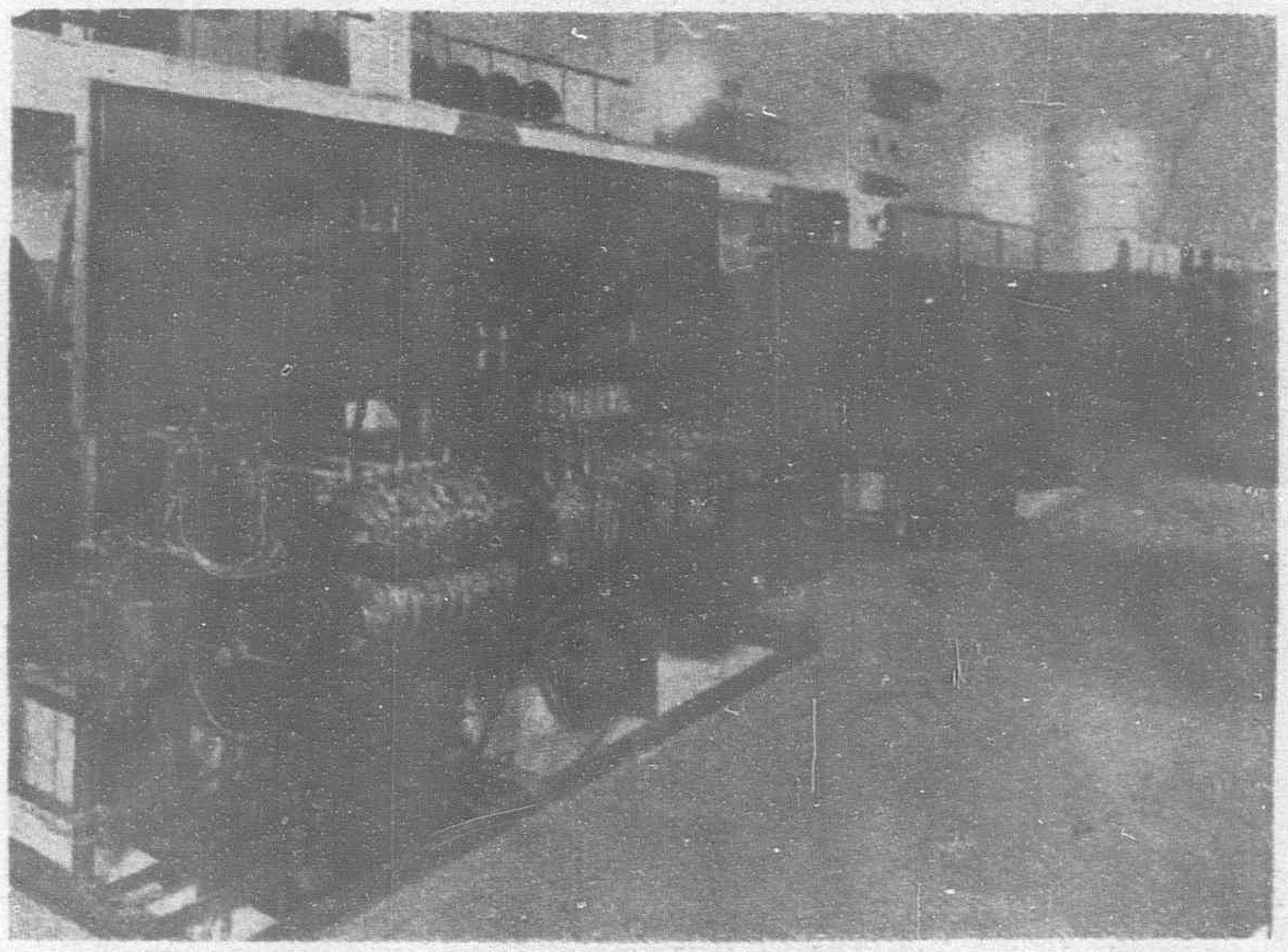
Normally, the first set is started-up by the operation of the master time-switch, which gives a closing impulse to the oil circuit-breaker closing relay. The oil-breaker having closed, the machines of the selected set run up on tap voltage, and synchronize, and if the machine contactor and machine high-speed breaker and feeder highspeed breaker control-switches have been previously closed, these breakers close and the set goes on load. The machines are connected in series through a high-speed breaker shunting a limiting resistance. The negative of the low-volt machine is connected to the negative d.c. bus-bar, and the positive of the high-volt machine is connected through a contactor to the 1,500-volt d.c. bus-bar. The closing circuits, for the above have control switches on the control desk, which are permanently closed for automatic operation.

On heavy overloads or short-circuits the feeder breakers open, but a timing device permits them to re-close automatically after

(Continued on page 772)



Interior of Heta station, showing three of the rotaries



Camshaft controllers and common relay panels in Heta station

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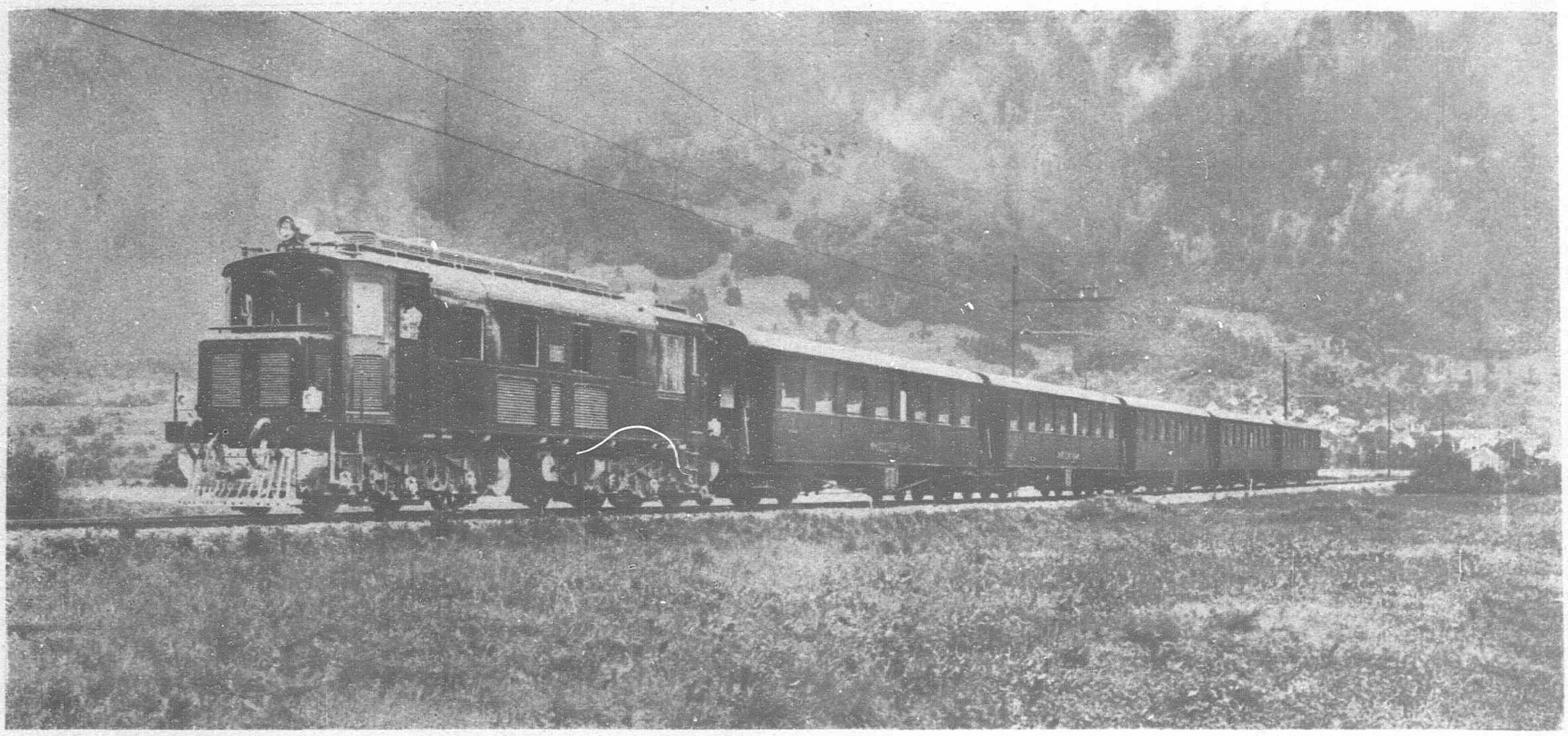
*The British Engineers' Export Journal.



Diesel-elecric locomotive of Siam State Railways equipped with an 8-cylinder Sulzer Diesel engine developing 450 b.h.p. at 700 r.p.m.

Sulzer Diesel-Electric Locomotives for Siamese Railways

Successful Tests are Carried Out in Switzerland

During the past few years the Diesel-electric railcar and locomotive have emerged from the experimental stage and proved their value both as regards efficiency and economy with reasonable maintenance costs, often under severe conditions, in various parts of the world. Several firms have played an important part in this development work, and of these none has a sounder record than Sulzer Brothers, of Winterthur, Switzerland. As long ago as 1912 this firm built their first Diesel locomotive, but at that time the Diesel-electric principle was not tried, direct drive being relied upon. Latterly, the Diesel-electric system has been developed by Sulzers and other firms, successful examples of which have been in service in various countries for a number of years.

First of these Units for Siam

In 1930 the Royal State Railways of Siam ordered six 450 b.h.p. Diesel-electric locomotives from Sulzer Brothers, and the first of these units has recently been completed and undergone exhaustive trials in Switzerland without any hitch and to the satisfaction of all concerned. The first of the Siamese Sulzer locomotives to be completed is shown in the accompanying illustrations. The locomotives are intended for operation on a meter-gauge line and will work through traffic on the Siamese main lines. They have been built to Sulzer Brothers' design, the electrical equipment being supplied by the Ateliers de Construction Oerlikon, and the mechanical parts of the locomotives by Henschel und Sohn A.-G., of Cassel, Germany.

The principal particulars are as follows :—

Gauge	3-ft. $3\frac{3}{8}$-in. (1 m.)
Length over buffers	44-ft. $6\frac{3}{4}$-in. (13.59 m.)
Distance between bogie pivots	24-ft. 3-in. (7.4 m.)
Wheelbase of bogies	9-ft. 10-in. (3 m.)
Number of driving axles	4
Number of carrying axles	2
Service weight (about)	60 tons
Minimum adhesion weight (about)	43 tons
Diameter of driving wheels	36-in. (914 mm.)
Diameter of free wheels	30-in. (762 mm.)

Sulzer Diesel engine, eight cyl., four stroke cycle Output (continuous) of the Diesel engine—

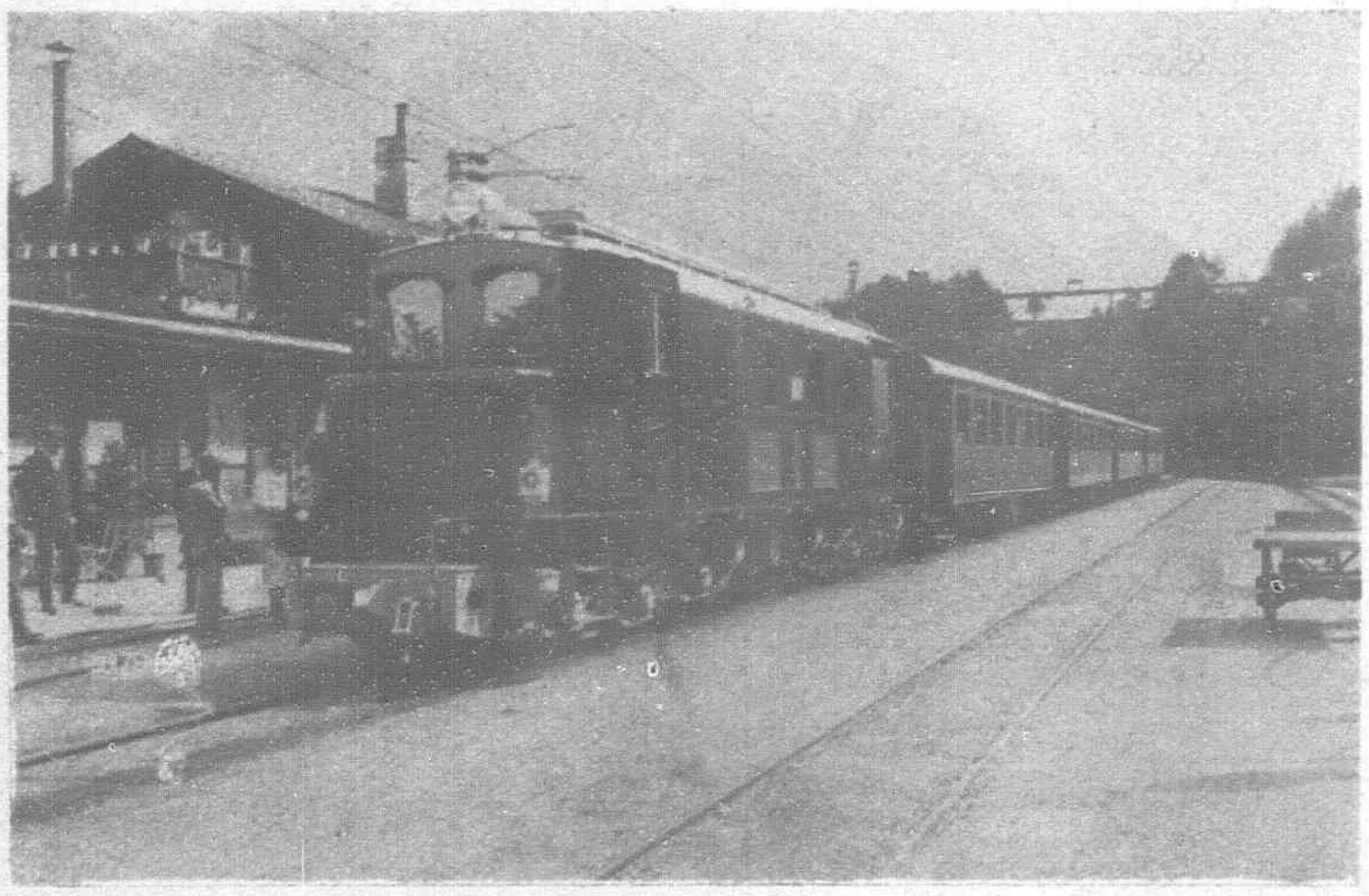
at 700 revs./min.	450 b.h.p.
at 620 revs./min.	400 b.h.p.
at 530 revs./min.	340 b.h.p.
Maximum speed	$37\frac{1}{2}$ miles/h. (60 km./h.)

Tractive effort—one hour rating—

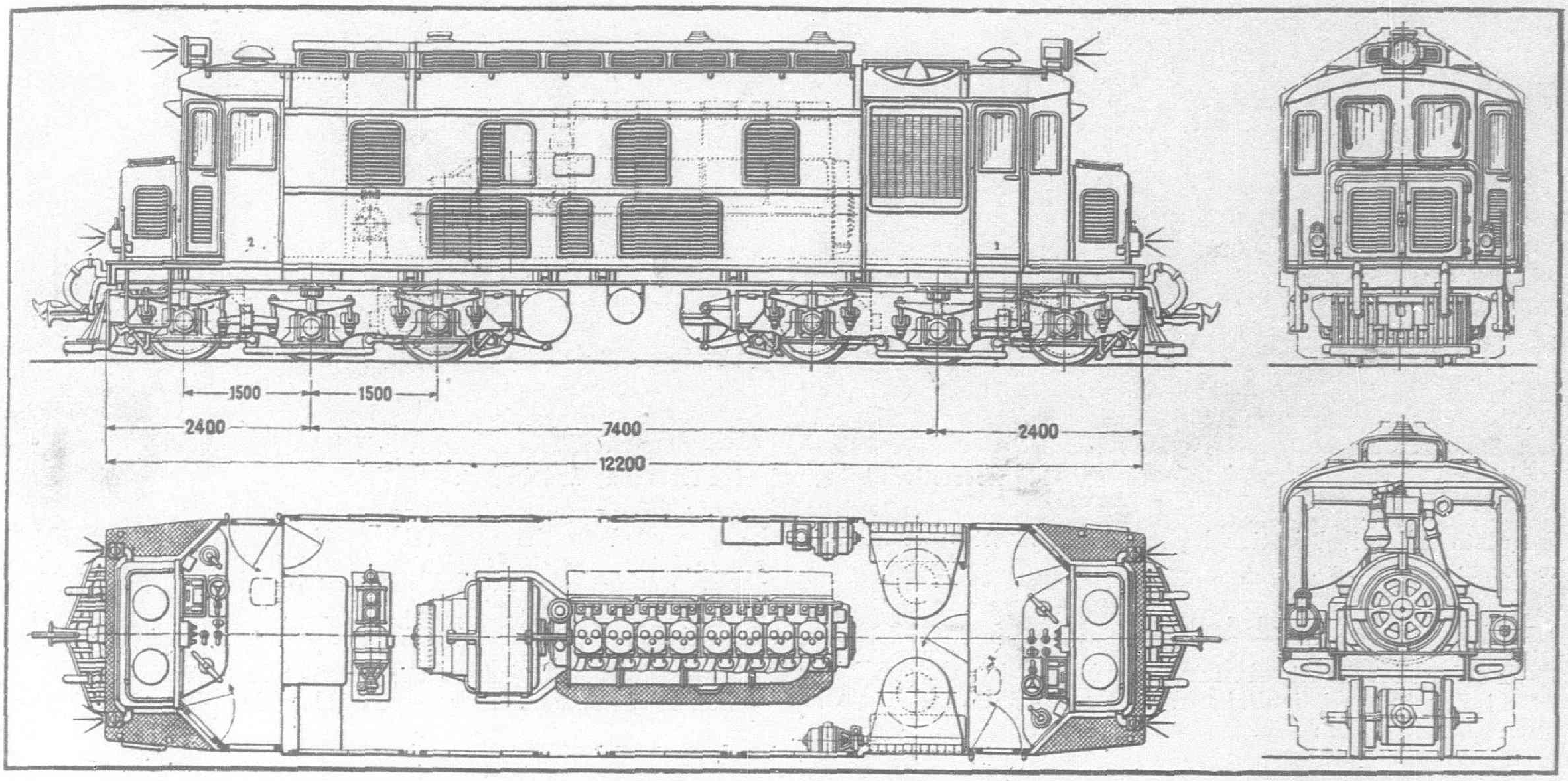
at 12.8 miles/h. (20.5 km./h.) 9,130 lb. (4,150 kg.)

Maximum starting tractive effort 20,680 lb. (9,400 kg.)

The frame of the locomotive is formed of deep section longitudinal members adequately crossbraced and provided with suitable engine bearers. The draw and buffer gear is fitted on the bogies, which support the main frame on spherical pivots and substantial side



Locomotive for Siam State Railways photographed at the Reichenau Station in Switzerland during trial run on the Landquart-Disentis Line



Elevations, cross-section and plan of one of the 450 b.h.p. Sulzer Diesel-electric locomotives for Siam State Railways

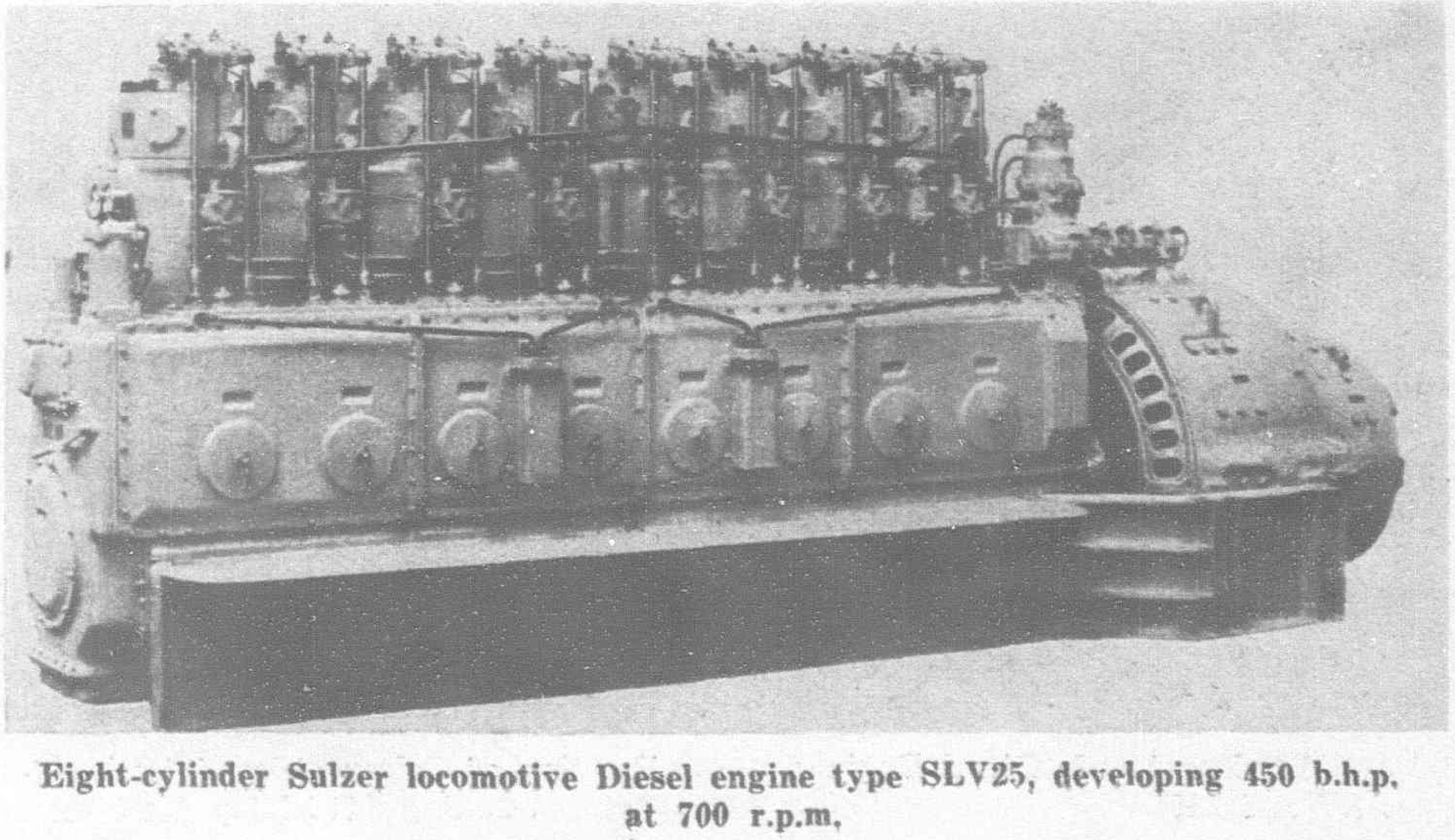
bearings. For the purpose of the trials over the Swiss railways, however, a temporary buffer construction had to be employed because the couplings and height of buffers above the track differ from Siamese standards.

An Eight-cylinder Prime Mover

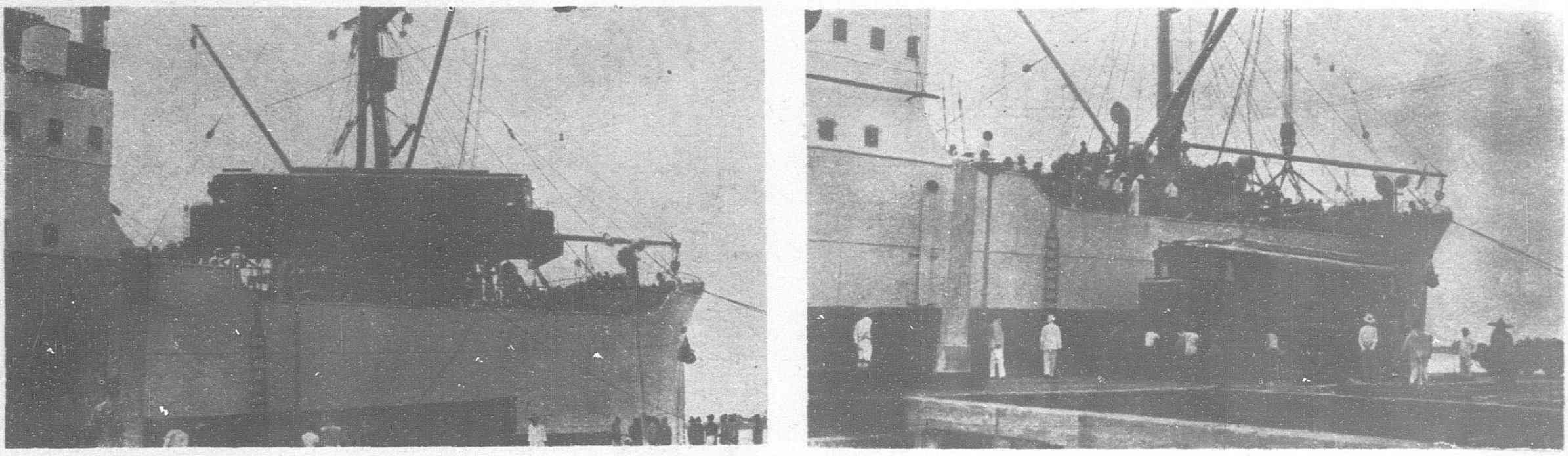
The body of the locomotive consists of a steel framework covered with sheet metal, and the roof over the engine compartment is removable, in order to facilitate overhaul of the Diesel-electric set; tanks for fuel and water, and the silencer, are arranged in the roof, where the regulating resistances are also situated, the latter being protected by a removable sheet-metal cover. The partitions between the engine compartment and the cabs are of strengthened sheet metal construction, as are the doors. The floor of the engine compartment on both sides of the Diesel engine is double; the lower floor is of sheet iron and the upper one, the actual floor, is of teak. The space between them is used for the cables and piping, which are thus protected against dirt and moisture, but are readily accessible for inspection. The prime mover consists of a standard Sulzer locomotive-type heavy-oil engine. It has eight cylinders and is of the four-stroke cycle trunk-piston type. The cylinders are cast in two blocks of four, which are bolted together to form a rigid longitudinal girder. The light main frame of the engine is of cast steel and is designed to ensure rigidity. The connecting rods are of chromium-nickel steel, while the uncooled pistons are of aluminium. The adoption of these special materials has made it possible to keep down the total weight, without sacrificing reliability; in particular the weight of the moving parts is low and this is conducive to vibrationless running.

Direct Airless Injection of Fuel

The engine operates with direct airless injection of fuel on the pre-combustion chamber principle, the pressure necessary for complete atomization of the fuel, as is well known, being obtained through partial combustion of the fuel in the pre-combustion chamber. This method of injection has the advantage of requiring a comparatively low injection pressure and fairly large nozzle holes, points of importance for reliability of working. Each cylinder has its own fuel pump, which is arranged between the push rods of the inlet and exhaust valves of the cylinder, where it is accessible; the pump is directly driven from the main camshaft and is of simple, robust design. The quantity of fuel delivered is automatically adjusted to suit the required output of the engine by means of a centrifugal governor which keeps the engine running at a constant speed. Although the acme of simplicity, this fuel injection system gives high economy over a wide range of loads. The engine is started by means of the main generator, which for this purpose is connected to a storage battery and works as a motor during the starting period. No starting air tanks or starting compressors are thus required. The generator to which the engine is coupled is self-ventilated, a fan mounted on its shaft drawing air through the moving parts. The four traction motors are of the nose-suspension type and are also self-ventilated, their torque being transmitted to the axles through reduction gearing. Each motor is equipped with a remote-control contactor and a maximum current relay. By means of a reversing switch, which can be operated from the cab electro-pneumatically, the traction motor fields are reversed in order to change the direction of running of the locomotive. The auxiliary generator, which supplies the current for the various auxiliary machines, the starting battery and also for exciting the main generator, is rigidly coupled to the main generator and consequently runs at the same speed. The whole set stands on a common auxiliary frame constructed of



Eight-cylinder Sulzer locomotive Diesel engine type SLV25, developing 450 b.h.p. at 700 r.p.m.



Showing locomotives being unloaded from ship at Bangkok

steel plate and rolled sectional iron, and is directly attached to the locomotive frame.

Designed for Three Speeds

In order that the Diesel engine may fully satisfy the conditions of service operation it is designed for three speeds, which can be chosen as desired from each cab, while the starting and stopping of the engine is also effected from the cabs. The engine can be stopped whenever the locomotive is coasting or standing in a station, and can be started again within a few seconds. This arrangement allows a considerable saving in fuel as compared with an arrangement where the engine is running continuously. The cooling water for the Diesel engine is circulated through coolers fitted on both sides of the locomotive. Two fans, driven by electric motors, draw the air, which enters the side walls, through the coolers, and then expel it through openings in the roof. By means of field tappings the speed of the fans, and consequently the cooling effect, can be varied. The coolers for the lubricating oil are integral with the water coolers. The principal circuit connects the main generator to the four series-wound traction motors, which work in parallel. By means of the controller fitted in each cab, resistances arranged between the rotor of the auxiliary generator and the field of the main generator are switched in and out. This makes it possible to change the tractive effort to suit requirements. By means of the simple arrangement of the controls and their gear, it is possible for one man to attend to the locomotive. In addition, fuel delivery to the Diesel engine, and also its lubrication and cooling, are entirely automatic, so that no special attendant is required for the engine, a strong point in favour of the design.

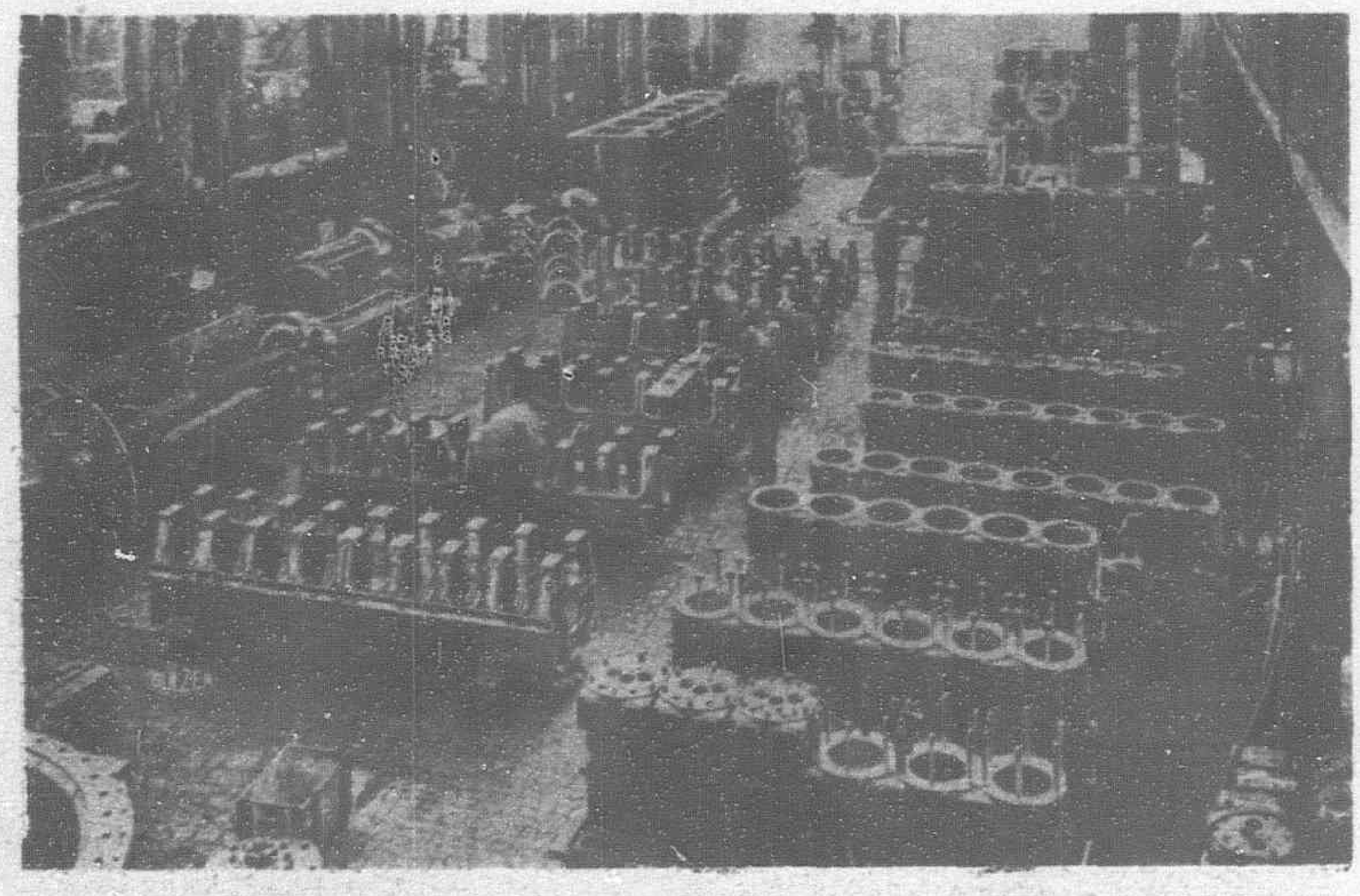
The Auxiliary Motors

The auxiliary machines that have to operate when the locomotive is running with the Diesel engine at rest or during halts, such as the motors of the vacuum pump and auxiliary compressor, may also be connected to the accumulators if required. The iron-nickel accumulators are situated in the front and rear sections of the locomotive. The charging contactor between the auxiliary generator and the battery closes the charging current circuit automatically as soon as the auxiliary generator voltage is above 130-volts. A return-current relay breaks the circuit when the voltage at the terminals of the auxiliary generator is less than that of the battery. The fans of the cooler are driven by series motors connected in parallel to the terminals of the auxiliary generator. These motors are not connected to the accumulators, since they have only to work when the Diesel engine is running. The cooling-water pump is driven by a series motor which comes into service automatically as soon as the engine is started. When the engine is at rest, the cooling-water pump may still be kept running by means of a switch fitted in the cab. This makes it possible to continue cooling the Diesel engine after it has been stopped and so avoid the possibility of cracked covers, and so forth. The current for the interior and exterior lighting of the locomotive is supplied by the battery of accumulators, and the intensity of the search-light can be varied by means of a dimming resistance.

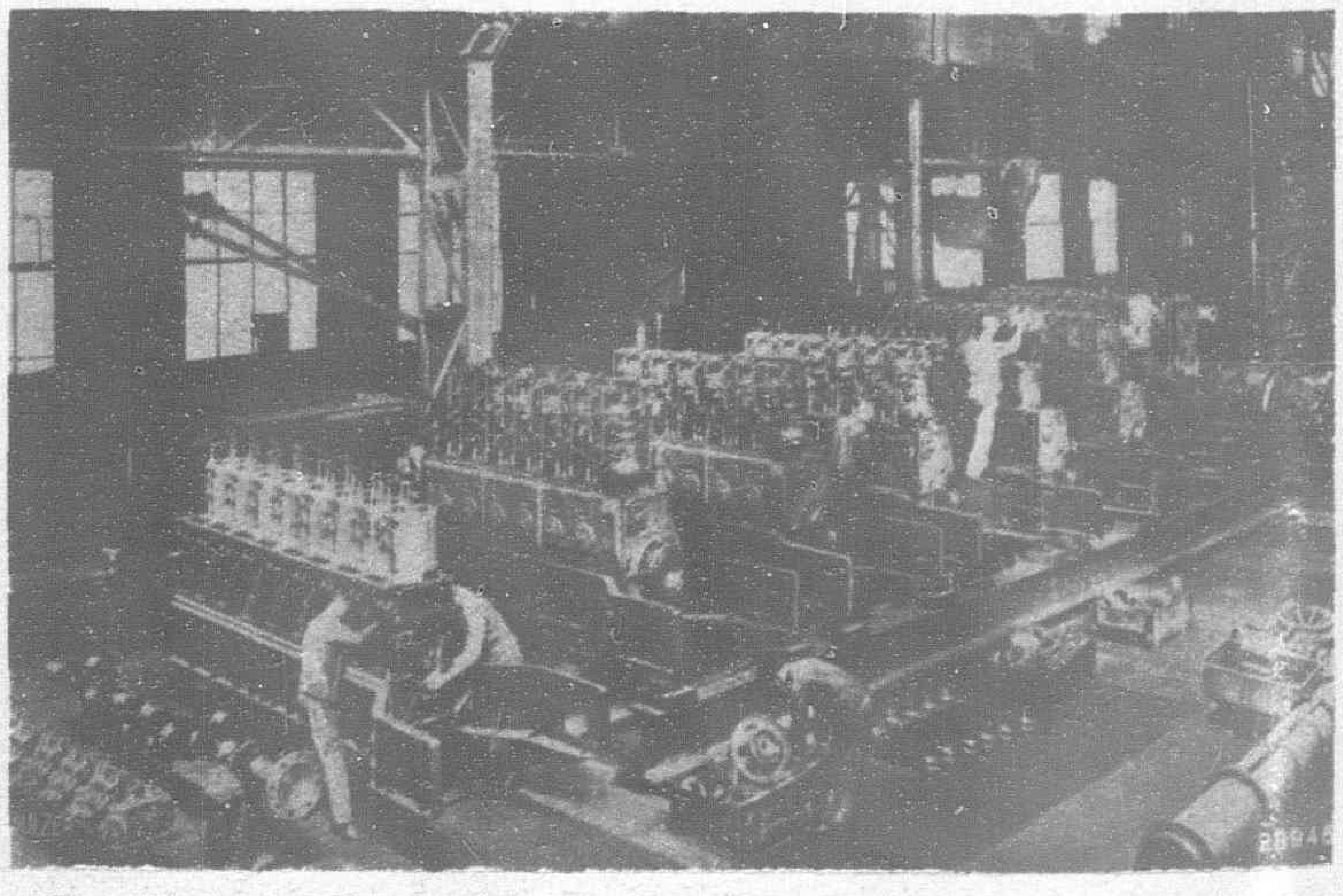
Controls

In each cab there is a controller by means of which the excitation of the main generation is altered. A switch is also provided for running forwards or backwards, which is connected with the speed adjustment of the Diesel engine, together with a starting and stopping switch for the engine. In addition, in each cab there is a switch for the vacuum pump and one for the cooling-water pump. The following instruments are also provided and are arranged so that they can easily be read by the driver :—a tachometer, showing the speed of the Diesel engine ; a watt-meter for the output of the main generator, and an ammeter for the traction motors. By means of the first two instruments the driver can see if the engine is running normally. If, however, for any reason one or more cylinders should

(Continued on page 758)



Series manufacture of high-speed Sulzer 4-cycle Diesel Engines, types LV and LH



Erection of Sulzer airless-injection 4-cycle engines, type LV25, totalling 2,790 b.h.p. for locomotives and rail cars

The Mulin Coal Mine, Kirin

THE Mulin coal mine is located at Mulin Hsien, on the upper reaches of Mulin River in the north-east of Kirin Province. It was an undeveloped district before the construction of the Chinese-Eastern Railway. After the completion of the railway and the operation of it for no more than three years, Mulin Hsien became one of the important market towns for food stuffs. It is 65 kilometers north of Hsia-chen-tze, 452 kilometers east of Harbin, and 331 kilometers west of Vladivoski on the Chinese-Eastern Railway.

The area of coal reserve of the mine is estimated at 28 sq. miles and 415 *mow*. The formation of the coal seams of the district divides the mine naturally into two groups. At present only the first group is under operation.

Only one seam of the first group of Mulin mine is under operation at present. It has a thickness of one meter and a length of 3,000 meters. The total amount of coal in this seam is estimated at 8,100,000 tons. The second group has also a thickness of one meter with a length of 1,600 meters with a total coal reserve of 7,695,000 tons. Calculated on the basis of producing 300,000 tons of coal a year, the mine can last for twenty-five years.

The composition of the coal is analyzed as follows: moisture 3.1 per cent, volatile matter 23.12 per cent, carbon 57.08 per cent, ash 16.10 and sulphur 0.6 per cent. The heating capacity is 6,600.

The Mulin coal mine has a very short history. Before the Revolution of 1911 there were a few native pits in the district. After the Revolution, a Russian was interested in the possibility of opening the mine and arranged with the Kirin Provincial Government to organize a company known as Mulin Coal Mine, a Sino-Russian concern, with the Chinese Government as one partner and the Russian merchant as the other. The Chinese Government gave the permit to open the mine and supplied a capital of $3,000,000. The Russian gave the same amount of capital and supplied technical experts. The total capital of the mine is $6,000,000.

The head office was established at Harbin. It was only in 1924 after a great deal of preliminary work together with a general survey of the coal deposits of the district was made that actual work at the mine was started. A total of 5,000 *mow* was purchased for the work and two shafts were started. The first shaft was operated under the direction of Russian experts and the second under the direction of Chinese experts. The railway which connects the mine with the Chinese-Eastern Railway was built in 1926 jointly by the Kirin Provincial Government and the Mulin Coal Mine Company. At the end of 1928 a total of 280,000 tons of coal were produced. The railway had a business of $44,500. The net profit of the Coal Mine Company of 1928 was $1,940,000.

The highest organ of the company is the Board of Directors composed of Chinese and Russian members. There are two directors (one Chinese and one Russian) and two managers (one Chinese and one Russian). All orders are to be executed in the name of the directors and managers. In the company there are four departments, namely, general affairs, secretariat, treasure, and technical departments. In the mine there are six offices, namely, mining affairs, railway affairs, machinery, treasure, engineering, and general affairs.

According to the figures of June, 1929, there were 35 people in the head office at Harbin, half Chinese and half Russians. In the mine there were 218 staff members, 107 Chinese and 112 Russians. Before the organization of the company in 1925 actual work was carried out for the production of coal in the district. One slide shaft, two perpendicular shafts, and seven tunnels were constructed. The length of the tunnels is 5,300 meters.

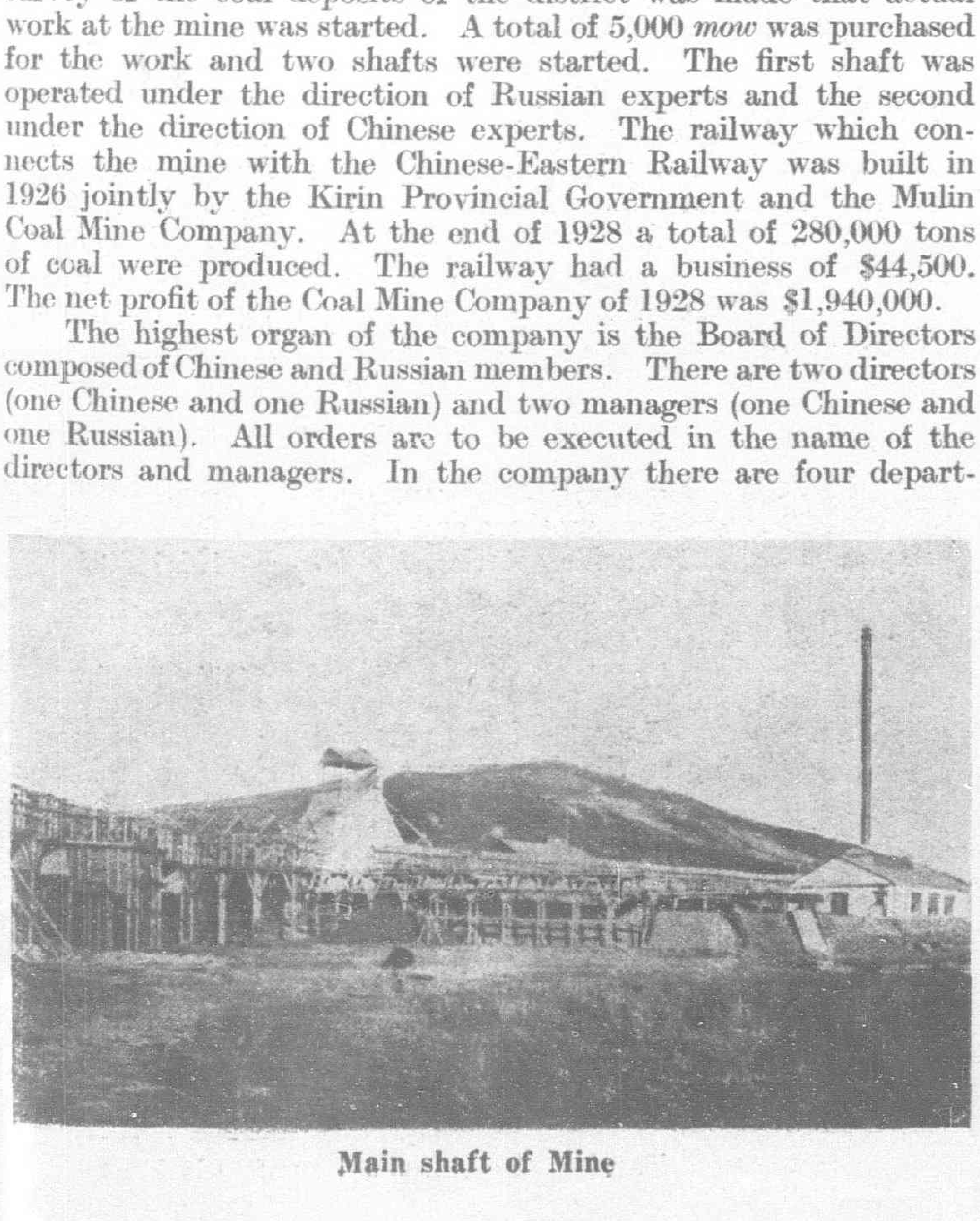
No. 1 perpendicular shaft: This shaft is located at I-hsia-chiu. Work on the shaft was started in September, 1925. Coal was produced first in April, 1926. The well has a depth of 38 meters, width of 2.2 meters, and a length of 4.8 meters. The machines of this shaft have a capacity of producing 700 tons of coal a day.

No. 2 perpendicular shaft: This shaft is 1,500 meters away from the first shaft. Work on this shaft was started in December, 1925. Coal was first produced by this shaft in September, 1926. The shaft has a depth of 51 meters, and the width and length are the same as that of the first shaft, with a capacity of producing 700 tons of coal a day. In addition to the two shafts described above, there are four small shafts for the purpose of sending in air as well as supplying timbering and other materials. The machinery for pumping air is located here.

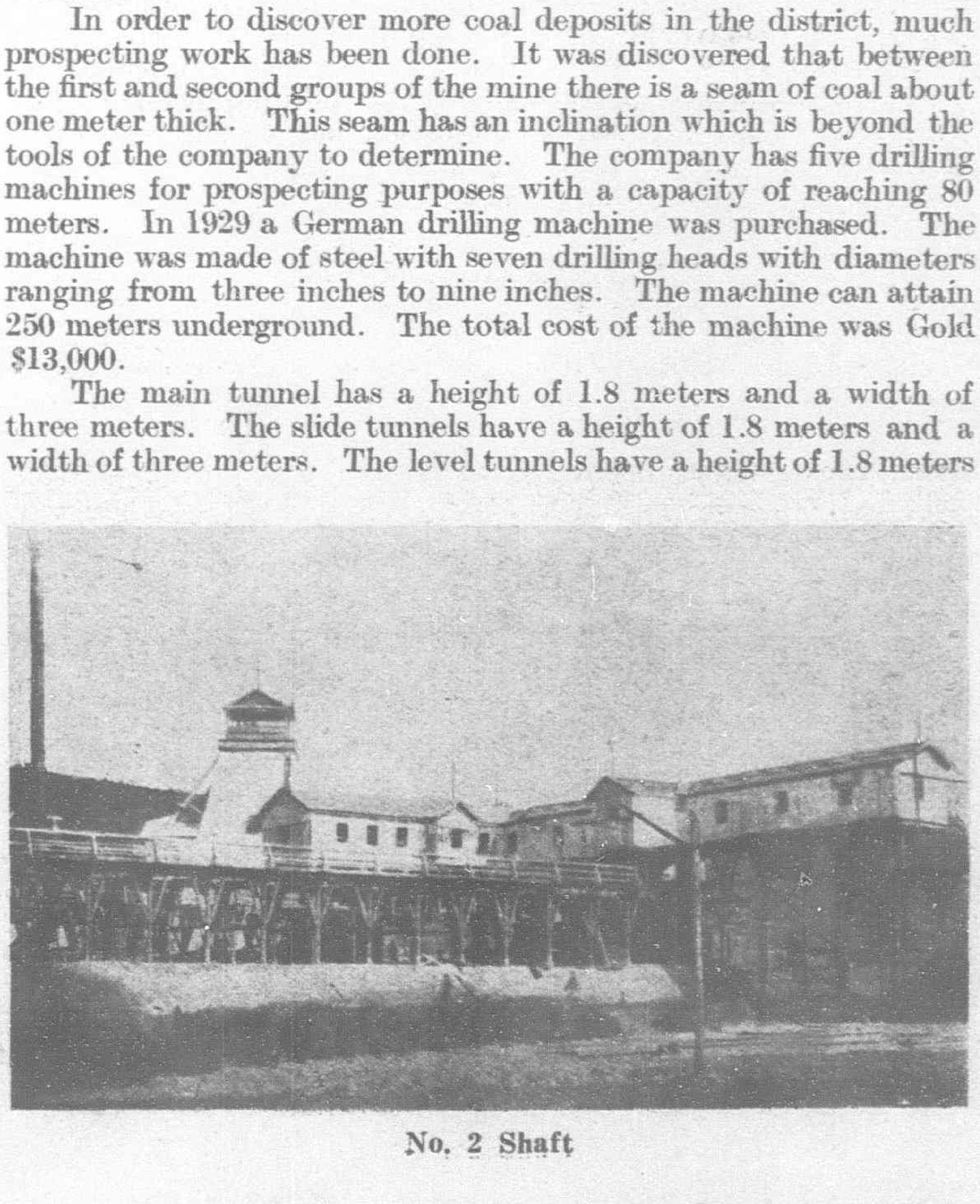
In 1928 owing to the great demand for coal and the prosperity of the company a project of expansion was considered. It was planned to build another branch railway of ten *li* to connect with the second group of the mine. It was also planned to open two more shafts. The total expenditure was estimated at $164,400. It was also estimated that in the first year after the completion of this new project a total 19,000 tons of coal can be produced. In the second year double of the amount can be produced. When the project was under construction the demand for coal was greatly decreased due to political reasons and the project was abandoned.

In order to discover more coal deposits in the district, much prospecting work has been done. It was discovered that between the first and second groups of the mine there is a seam of coal about one meter thick. This seam has an inclination which is beyond the tools of the company to determine. The company has five drilling machines for prospecting purposes with a capacity of reaching 80 meters. In 1929 a German drilling machine was purchased. The machine was made of steel with seven drilling heads with diameters ranging from three inches to nine inches. The machine can attain 250 meters underground. The total cost of the machine was Gold $13,000.

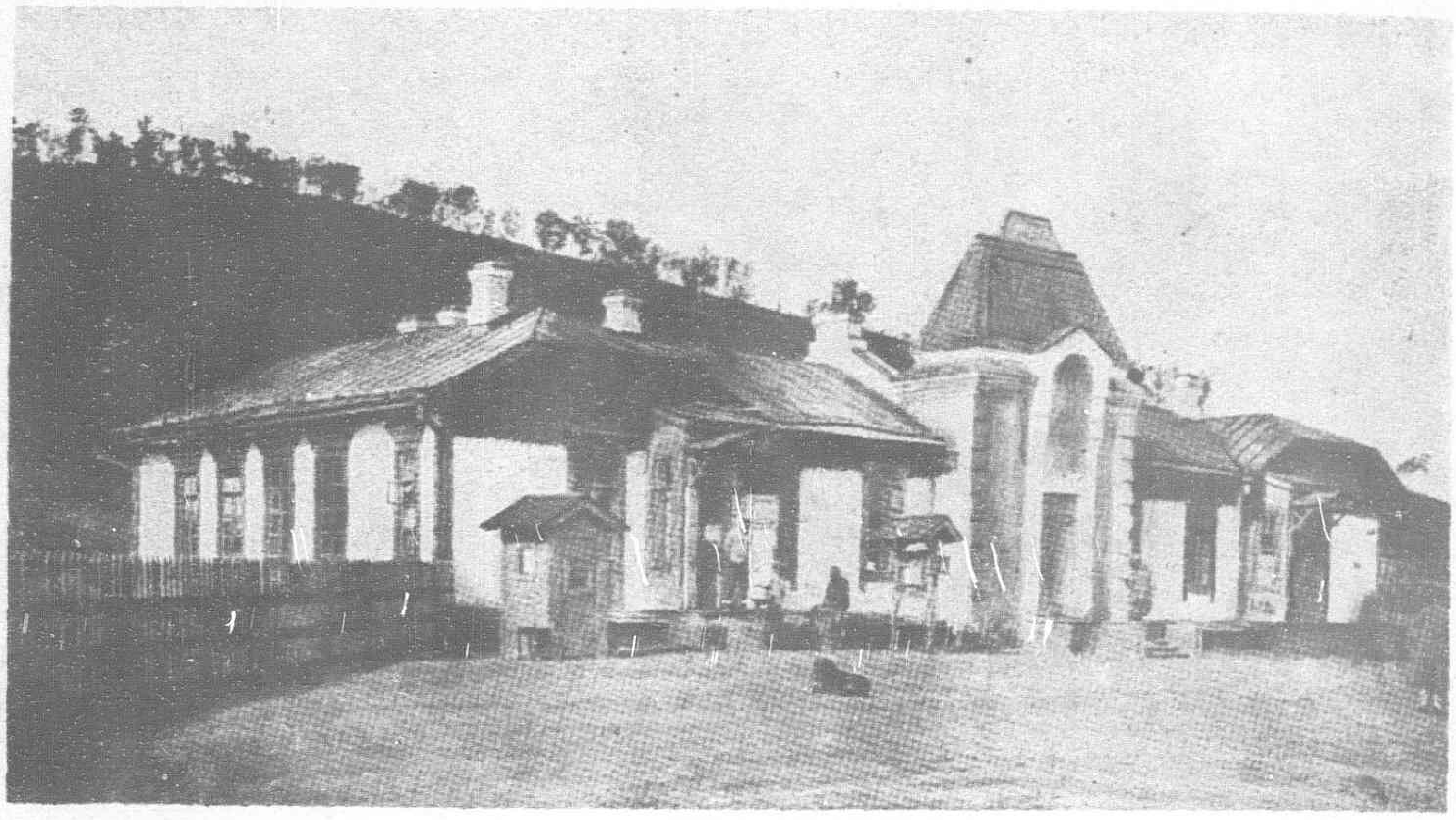
The main tunnel has a height of 1.8 meters and a width of three meters. The slide tunnels have a height of 1.8 meters and a width of three meters. The level tunnels have a height of 1.8 meters



Main shaft of Mine



No. 2 Shaft



Offices of Mulin Coal Mine

and a width of two meters. The coal is dug out by man-power. It was only in 1929 that four digging machines were purchased from a German firm to substitute for men at a cost of $212 each. The tunnels are protected by timbering.

There are a total of 38,430 meters of single rail cars for the haulage of coal. The coal cars are of three kinds. The first is that of the Arthur Koppel model, German made with a capacity of one ton. There are 59 cars of this kind which were bought at a cost of $267.3 each.

The second kind is also German made. It is of the Grubenwagen model with a volume of 00.6 cubic meters and a capacity of .55 tons of coal and a weight of 300 grams. There are 200 cars of this kind in the mine which cost $247.38 each. The third kind of cars were made of wood by the company with a capacity the same as the second kind of German made cars.

There are two hoists, one at each shaft. The shaft has 85 h.p. and the boilers have a diameter of 2.75 meters and a speed of 2.5 meters per second at a capacity of 2,000 grams of coal. The cost of each hoist was $25,816.89. Another hoist was installed recently. It has 32 h.p. and the diameter of the boiler is two meters. The speed is 0.25 meters per second. A total of 660 tons of coal can be handled in 20 hours. The cost of the machine is Gold $3,201.25.

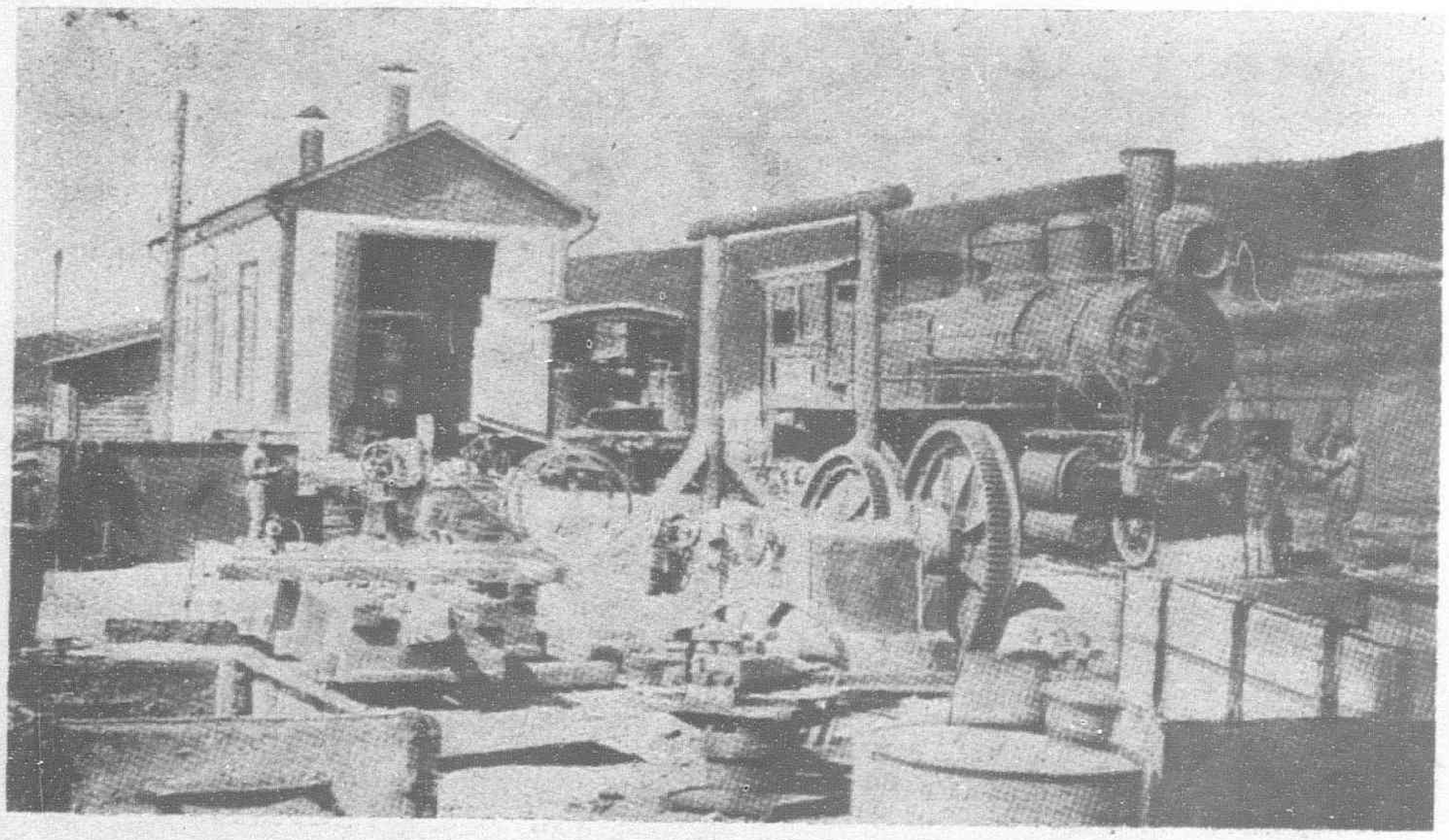
The machine for pumping water was supplied by a German firm. It pumps 43 to 46 times every minute. There are altogether four water pump machines at a cost of Harbin $2,444.13 each. In addition to these, there are another four Washington model pumps at a cost of Harbin $802 each.

In the mine there are four machines for pumping in air to the tunnels. Two of these are Japanese made and two are German made.

In the tunnels there are five kinds of lamps in use, namely, candles, oil lamps, acetylene lamp C_2H_2, electric lamps, and safety lamps. There are 250 Wolf safety lamps at a cost of Gold $1.87 each. There are another 250 safety lamps of another model at a cost of Gold $1.95. There are 5,000 glass safety lamps at a cost of Gold $5.10 each.

Production.—The production of coal in the mine is as follows:

Year	*1st and 2nd grade of coal*	*3rd grade of coal*	*Total*
1925	52,295 tons	11,153 tons	63,448 tons
1926	96,121	8,122	104,243
1927	196,064	12,569	208,633
1928	256,925	24,112	281,037
1929	92,647	11,570	104,217 (note)



Locomotives of the Mulin railway

Note.—The figure for 1929 is that of the first six months.

The mine has one central power house. It was installed by the Skoda Works. There are altogether eight boilers. The area of heat is 60 cubic meters each, pressure, 8.5, weight of the boiler 13,500 grams and the cost of each is Harbin $6,210. There are two machines for generators to produce electricity at a cost of Harbin $12,800 each.

Many other machines are used by the mine. The total cost of other equipment, not mentioned above, is estimated to be more than $19,333.

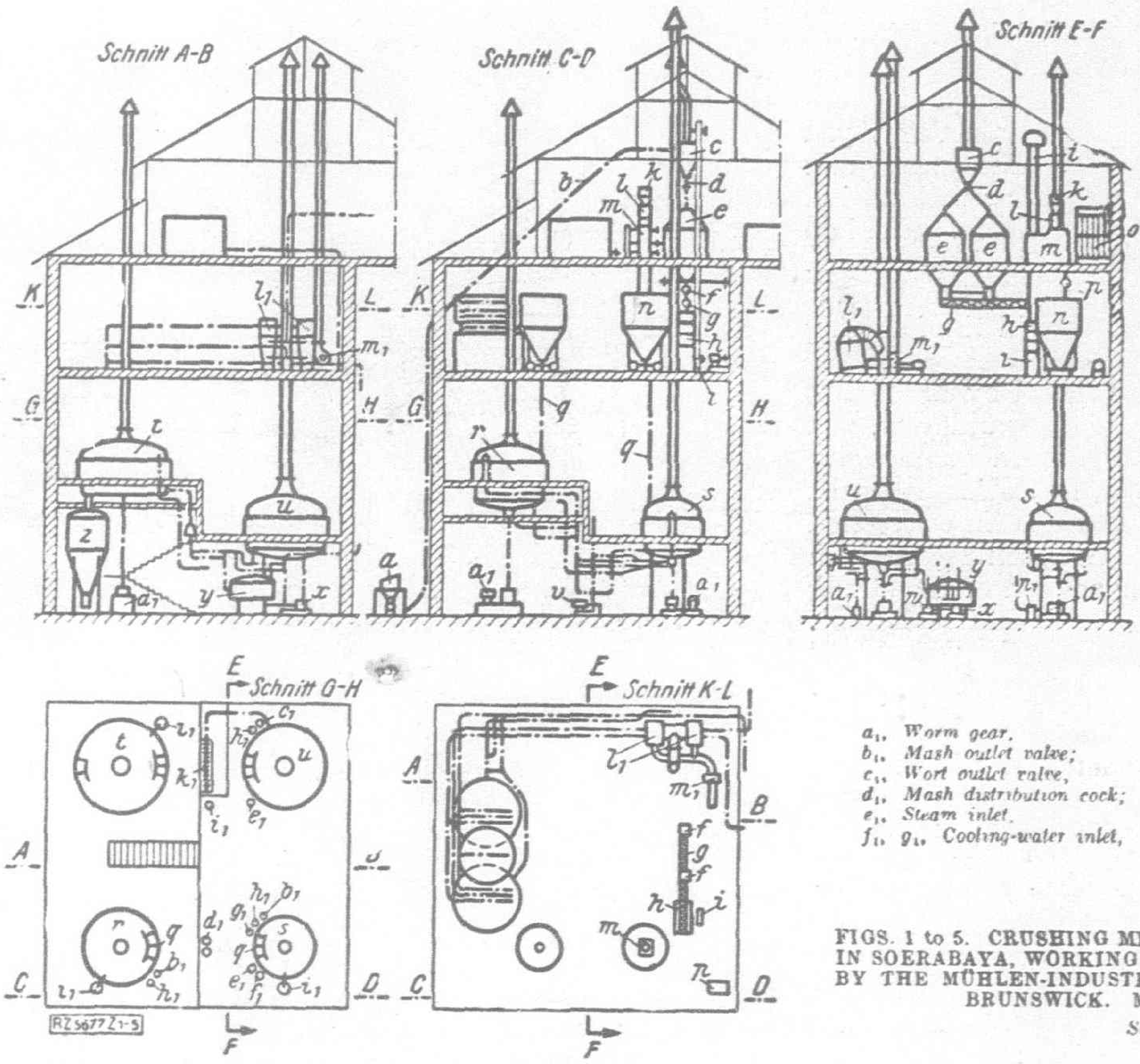
The mine depends on the Mulin railway to transport coal to other cities. The Mulin railway was built by the Kirin Provincial Government and the Mulin Coal Mine Company. A coal yard with machines for loading and unloading coal was built by Skoda Works and it was completed at the end of 1930 at a cost of 300,000 roubles. The railway connects the mine with Hsia-chen-tze station of the Chinese Eastern Railway. The locomotives and other rolling-stock of this railway were bought from an American manufacturing company at a cost of Harbin $191,734.84. The total number of pieces of rolling-stock is 30.

According to the report of the department of Treasure the assets of the Company, on January 1, 1929, were as follows:

Land and buildings	Harbin $2,460,116.76
Machinery ...	188,760.84
Locomotives and rolling-stock ...	191,734.84
Others	322,887.73
Total	$3,163,500.14

Profit.—Net profit of the Company according to the department of Treasure is as follows:

Year		*Net profit from :*	
1924, 1925	...	coal	$65,072.74
1926	...	coal	263,391.65
1926	...	railway	119,948.63
1927	...	coal	879,338.63
1928	...	coal	1,505,678.05
1928	...	railway	445,038.82
Total	...		$3,612,772.06



a, *Charging hopper with discharg device and blower*,
b, *Pressure pipe*,
c, *Separator*,
d, *Distributor*,
e, *Storing bins*,
f, *Mixing apparatus*.
g, *Endless-screw conveyor*,
h, *Malt cleaning machine*,
i, *Bucket conveyor*,
k, *Hopper with magnetic separator*
l, *Automatic weighing machine*,
m, *Malt-mill*,
n, *Movable grist-hopper*,
o, *Hose filter for air-supply*,
p *Air regulator*,
q, *Mashing machine*;
r, *Mash-vat*,
s, *Mash-tun*,
t, *Clarifying vat*,
u, *Copper*;
v, *Mash-pump (behind which is the pump for the un-clarified wort)*;
w, *Wort-pump*;
x, *Hop-pump*,
y, *Hop-back*,
z, *Spent grain container and juice-pump*

a_1, *Worm gear*,
b_1, *Mash outlet valve*;
c_1, *Wort outlet valve*,
d_1, *Mash distribution cock*;
e_1, *Steam inlet*,
f_1, g_1, *Cooling-water inlet*,
h_1, *Steam blow-off valve*
i_1 *Water mixer*,
k_1, *Clarifying battery*,
l_1, *Copper-vapour condenser*,
m_1, *Suction fan*
n_1, *Condensate trap*

FIGS. 1 to 5. CRUSHING MILL AND BREW HOUSE OF A BREWERY IN SOERABAYA, WORKING ON THE NATHAN PROCESS DESIGNED BY THE MÜHLEN-INDUSTRIE AKTIENGESELLSCHAFT (MIAG) OF BRUNSWICK. MASH CAPACITY 2 25 tons

Schnitt = Section

Brew-house Installation in Soerabaya

A brew-house built for the Nathan process is illustrated and the modern developments in brewing-coppers, malt-crushing mills and copper-vapor condensers are described

by J. SCHAFER, Brunswick

In the preliminary stages of beer preparation, *i.e.* malt-crushing, mashing, and wort extraction, the Nathan process does not differ from the customary processes. It deviates at the fermentation stage, which is carried out in closed vessels in a completely sterile manner. Storage, as an after-fermentation process, follows immediately after the preliminary fermentation, and is carried out in the same manner. The completely sterile process has proved itself advantageous, especially in the tropics.

Figs. 1 to 5 show the brew-house of a brewery in Soerabaya, Java. The incoming malt is conveyed by compressed air to the malt-bins *e*. from which it is carried by an endless screw and bucket conveyor to the malt-cleaner, consisting of a malt-brushing machine *h* with dust-filter. Over an automatic recording weighing machine *l*, it then passes to the malt-mill *m*, from which it is discharged into a grist-hopper car *n*. From this is it dropped into the mashing vat *r*, of the brew-house, and is there mixed with water and mashed. The mash is brought to the temperature at which conversion of the starch takes place, in the "Feukon" mash-tun *s*, portions of the mash being made to boil from time to time; at the conclusion of this process, the base of the beer, the wort, has been formed.

The wort is separated from the residual solids of the malt, the spent grain, in the clarifying vat *t*, and runs maitcallyin to the

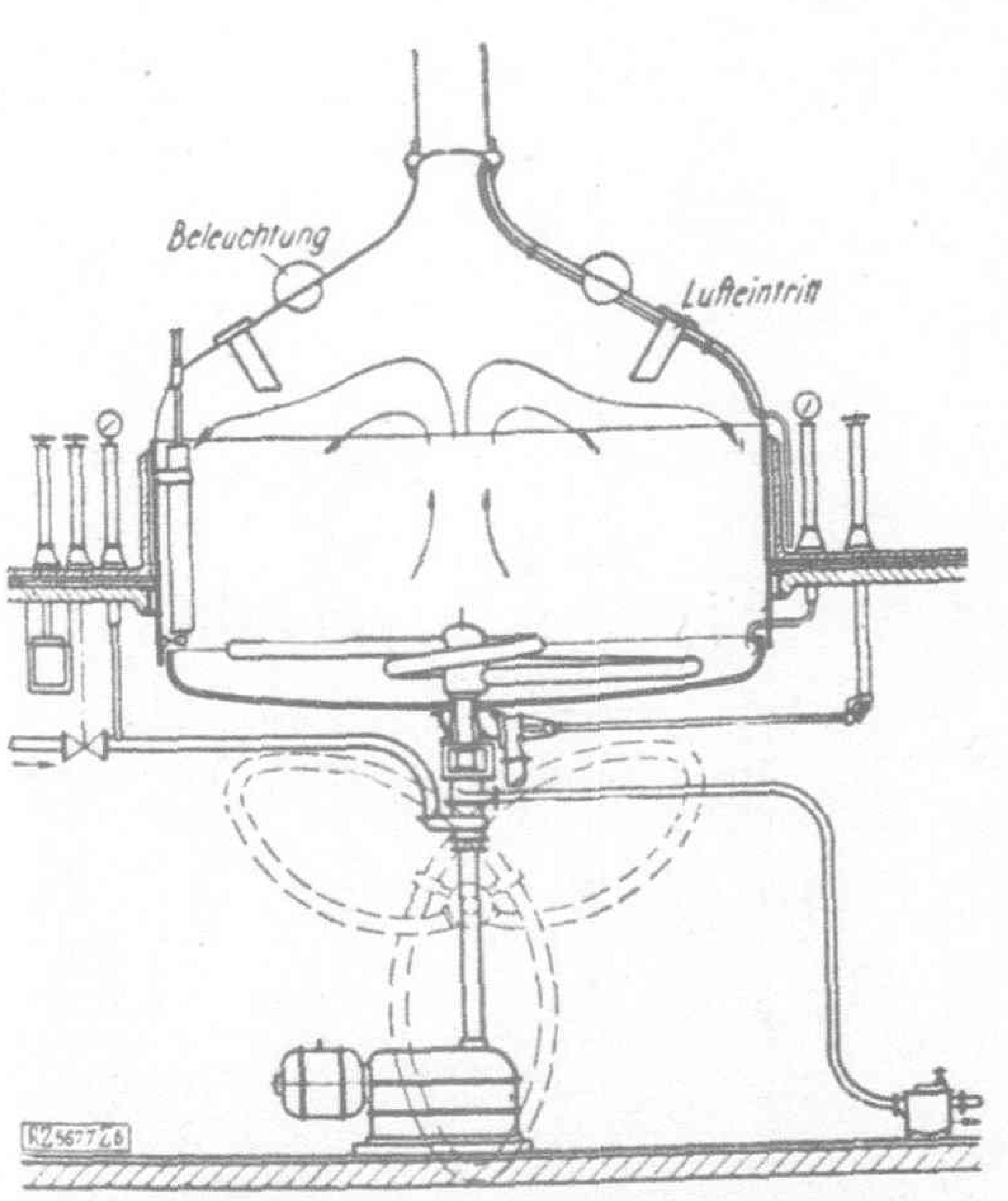


Fig. 6.—Feukon Brewing-copper, Heated with High-pressure Steam. Material: Copper and Bronze

Beleuchtung = Illuminaton; Lufteintritt = Air inlet.

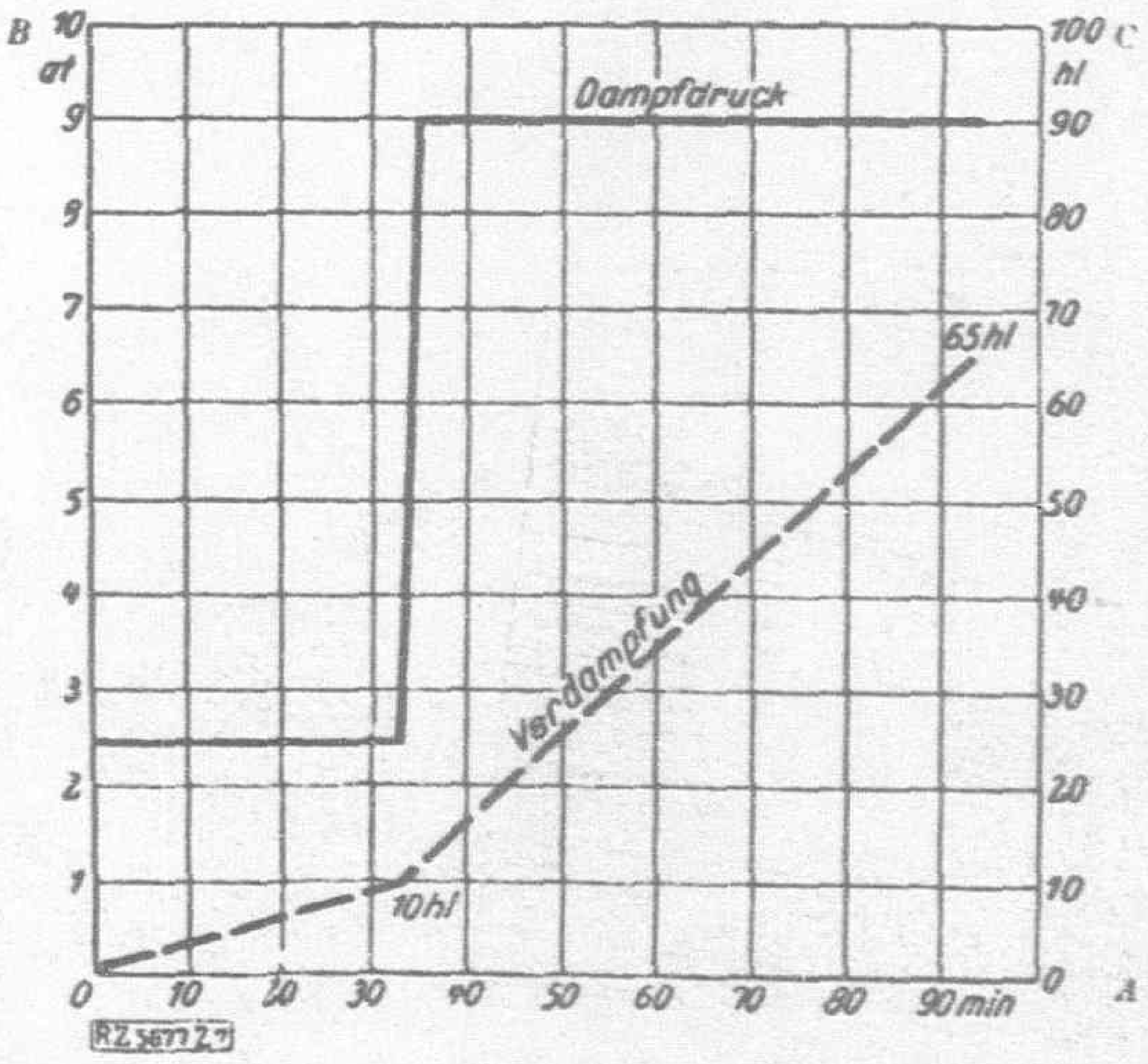


Fig. 7.—Diagram of Wort-boiling with the Feukon Steam Brewing-copper. Quantity of Wort at commencement of boiling, 340 hectoliters (1,200 cu. ft.)

Dampfdruck = Steam pressure; Verdampfung = Evaporation.

A, *Time in minutes*;
B, *Steam pressure in atmospheres (1 at = 14.2 lb. per sq. in.)*;
C, *Quantity of water evaporated, in hectoliters (1 hl = 3.5 cu. ft.)*.

copper *u*, to be boiled with the added hops. In the clarifying vat *t*, the spent grain is cut up with knives and lixiviated with hot water. This water is partly evaporated again in the copper. The finished hot wort on leaving the copper, passes through the hop-back *v*, the strainer of which retains the hops, and is then conveyed to the cooler by means of a centrifugal pump. The spent grain passes from the clarifying vat to a pressure hopper *z* with conical bottom, from which it is forced out by steam pressure. The hop residue is removed from the hop-back by means of a hop-pump *x*. Most of the machines are provided with individual electric drive.

Some details of the installation are described in the following notes :—

Opinions as to the relative value of beer boiled by steam-heat and beer boiled by fire are divided in the brewing industry, and well-known breweries producing beers of recognized quality give decided preference to the fire-boiling method. The essential difference between boiling by steam and by fire, is in the convection produced. In a flat fire-heated copper, convection starts from the bottom in the middle of the copper, as a result of the strong heat of the fire, and proceeds upward in a strong central current. To attain the same condition with steam boiling, the "Feukon" copper, Fig. 6, was adopted in the above-mentioned installation. This is of a very flat construction, so that a heating element arranged at the bottom and supplied with high-pressure steam, produces a strong central convection current, as in the case of a fire-heated copper. Fig. 7 shows the diagram of the wort boiling. In the Nathan process, the separation of the albuminoids, which is obtained by rapid rate of evaporation, is the decisive factor. In an acceptance test[1] a thermal efficiency of 98.1 per cent was obtained with a copper capacity of 200 hectoliters (707 cu. ft.) of water. Out of 200 hectoliters of wort, 10.4 per cent was evaporated in one hour. The resultant wort showed 13.4 deg. B.

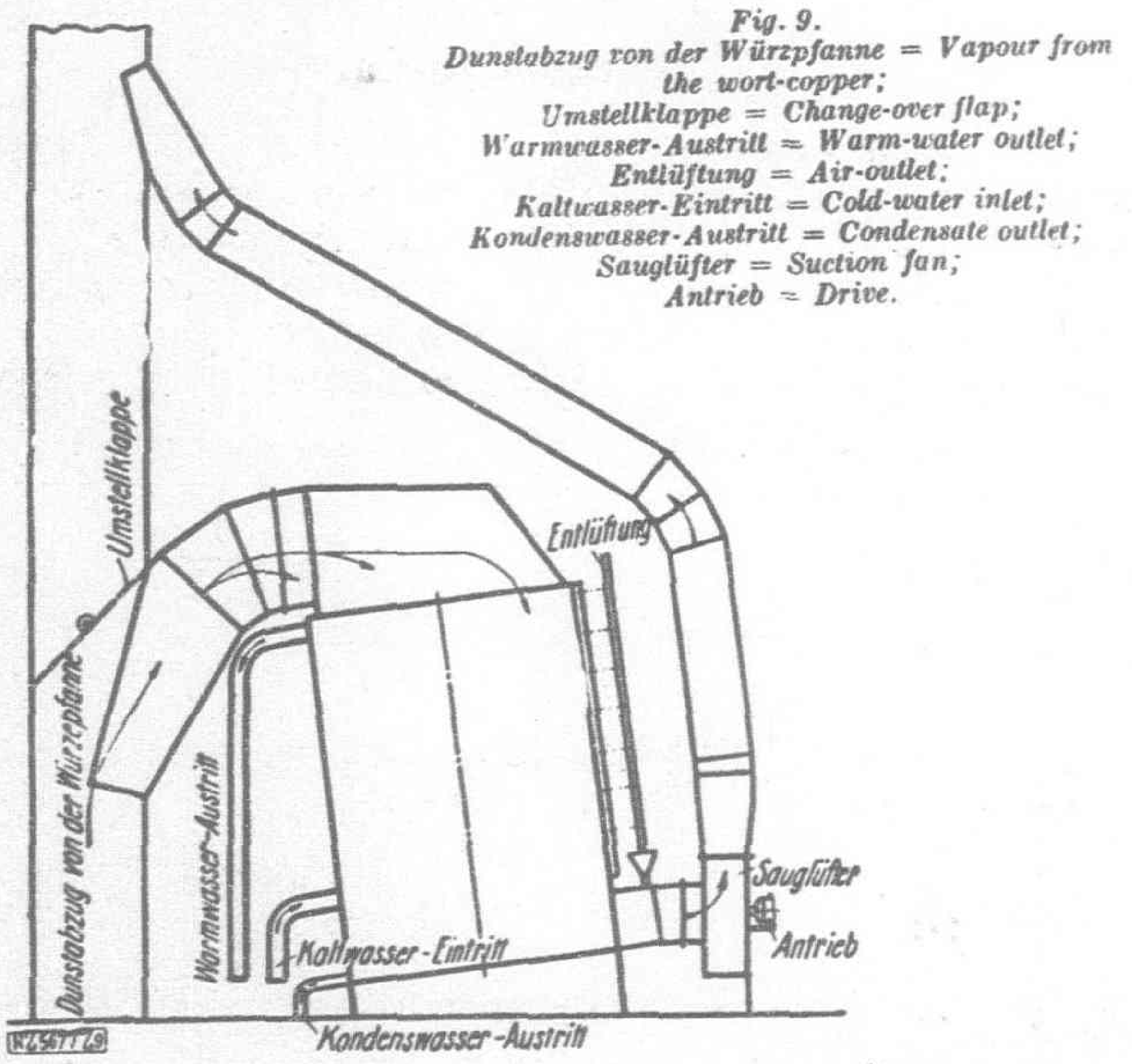
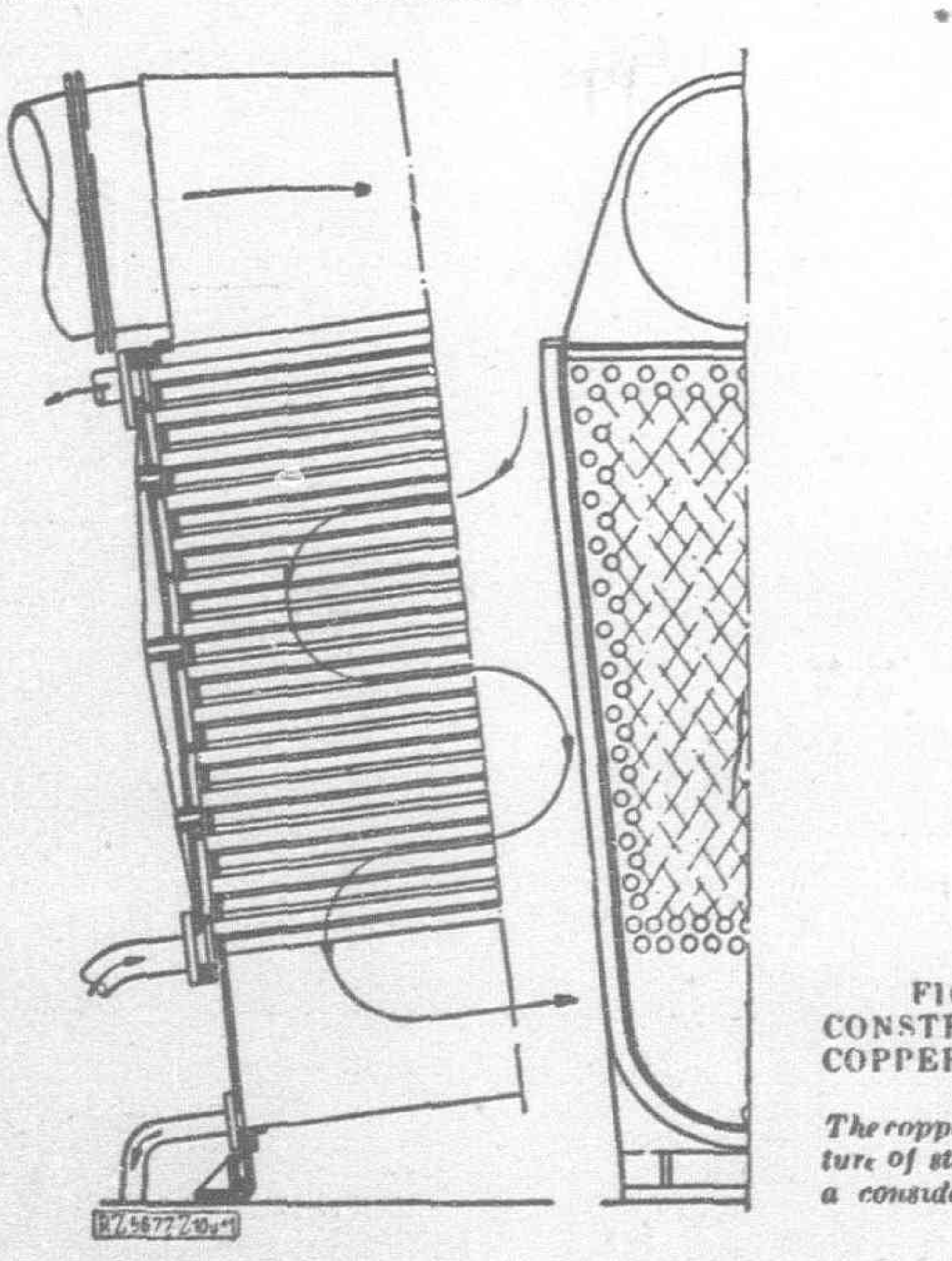


Fig. 9.
Dunstabzug von der Würzpfanne = Vapour from the wort-copper;
Umstellklappe = Change-over flap;
Warmwasser-Austritt = Warm-water outlet;
Entlüftung = Air-outlet;
Kaltwasser-Eintritt = Cold-water inlet;
Kondenswasser-Austritt = Condensate outlet;
Sauglüfter = Suction fan;
Antrieb = Drive.



FIGS. 9 to 11
CONSTRUCTION OF A COPPER-VAPOUR CONDENSER
The copper-vapour is a mixture of steam and air, with a considerable air content.

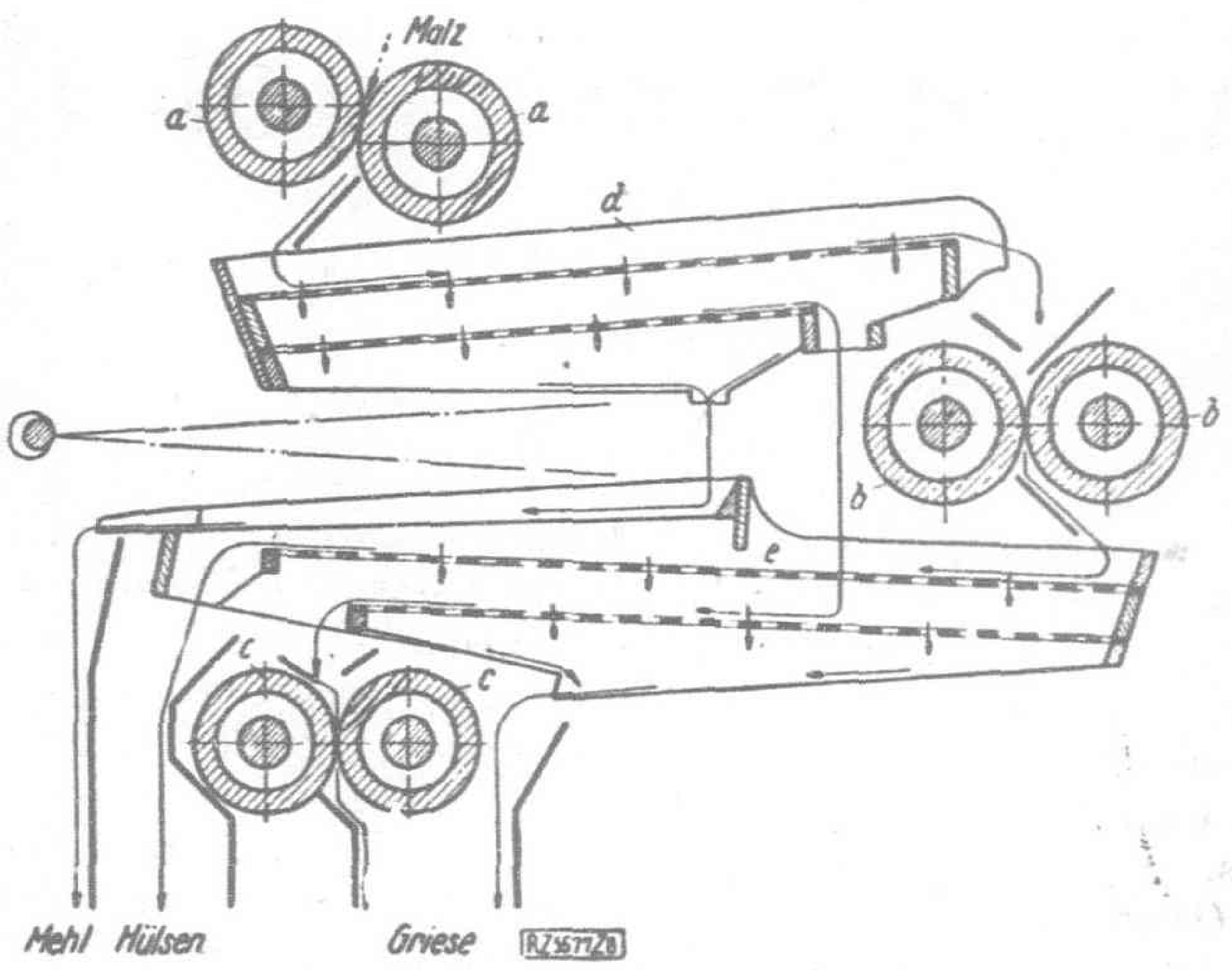


FIG. 8. ARRANGEMENT OF THREE-STAGE MALT-CRUSHING MILL

Malz = Malt.
Mehl = Meal.
Hülsen = Husks.
Griese = Grist.

a, b, c, First, second, and third set of rolls.
d, e, Screens.

The malt-mill has three crushing stages arranged underneath one another, with intermediate screens for the separation of the finished product, as shown in Fig. 8. The preservation of the husks and the consequent prevention of the formation of bran meal and the reduction of the meal-content of the grist, are important factors which improve the efficiency of the mashing process and the quality of the beer, and moreover have a favorable effect on the clarifying process and the output.

Special notice should be taken of the copper-vapor condensers, shown in Figs. 9 to 11, which utilize the heat of the vapors from the boiling coppers for warming the fresh water. The free section of the condensers is reduced towards the bottom, in accordance with the direction of the vapor current, with a corresponding reduction in the spacing of the water-tubes, to allow for the decrease in volume of the vapor resulting from condensation and cooling as it passes through the condenser.

Inclination of the cooling tubes prevents the condensate dropping from one tube to another; the condensate runs along the underside of each tube to the back plate, on which it flows down into the discharge pipe.

Sulzer Diesel-Electric Locomotives for Siamese Railways

(Continued from page 754).

misfire or cut out during service, which may happen owing to failure in delivery of fuel, the governor will cause the load to be distributed over the other cylinders, which are consequently over-loaded. This is soon observed and can be corrected, as an additional instrument is fitted in the cab to show the lift of the governor, which at once indicates any irregularities in the working of the engine. The same apparatus also contains an indicating device to show if the cooling water and lubricating oil are circulating normally. In each cab there is also an instrument to show the speed of the locomotive. The locomotive is provided with a vacuum brake and a hand brake. Compressed-air sanders, for all driving wheels and for both directions of running, are fitted on the bogies.

The extensive trials to which the locomotive was submitted were carried out on the Rhaetic Railways, and from our own observation we should imagine the results must be very satisfactory alike to the purchasers and the builders of the locomotive. The manuoevring and shunting operations were carried out with ease and smoothness and the train was stopped on the most difficult stretch of the track, that is, on a gradient of 1 in 37 and with curves of 100 m. radius. The time for the acceleration from stop to 19 miles per hour was the exceptionally good one of 30.35 sec. The fuel consumption during the trials averaged .035 lb. per ton-mile (10 grammes per ton-km.), based on the gross weight of the train, including the locomotive. It is not without interest to learn that locomotive engine orders at present represent one of the most important phases of Sulzer Brothers' Diesel-engine manufacturing activities. At the time of writing we are informed that approximately 15,000 b.h.p. of locomotive engines are under construction in the shops at Winterthur, some of the sets being for locomotives of over 1,500 b.h.p.

Public Service of Phototelegraphy in Japan

By SANNOSUKE INADA, Director General of Telegraph and Telephone Engineering Department of Communications, Japan

IN spite of the comparatively short time that phototelegraphy has been in practical use, it has already proved of vast importance for communication purposes.

In July, 1928, the Department of Communications of the Imperial Japanese Government issued a Departmental Ordinance, permitting the granting of licenses for the operation of private phototelegraph equipment to newspapers, on the condition that such equipment be used for the transmitting of newspaper publications. Upon the occasion of the Imperial Coronation of that year, the *Osaka Mai-Nichi* (Daily News), the *Asahi* (The Rising Sun) and the *Nippon Dempo Tsushin-Sha* (Telegraph News Agency) took advantage of this ordinance and equipped phototelegraph tnstallations on their private lines. These installations were effectively utilized, with the result that the scenes of the Grand Coronation were transmitted to distant places with the least possible delay and were distributed by means of "Extras" to the public, who received the pictures with great excitement.

Shortly after this, our Department decided to open a public phototelegraph service between Tokyo and Osaka, adopting the N. E. system. The installation in both central telegraph offices and also in the Nagoya repeating station was finished in April, 1930. On the 20th of August, the inauguration of this service took place in the presence of notabilities, customers, and experts who were assembled at the two terminal offices. The ceremony was commenced by the passing of congratulations by Mr. Koizumi, the Minister of Communications, to Mr. H. Seki, the Mayor of Osaka, and this was immediately followed by a cordial reply and many other messages from the gentlemen present. All of the pictures and manuscripts transmitted during this occasion were received with excellent results and were handed over to the addressees. Since then the public service has been carried on with satisfaction.

The N. E. system was invented by Dr. Y. Niwa and Mr. M. Kobayashi, of the Nippon Electric Company, Limited, and a detailed description by Dr. Niwa* has been published. Subsequently, some improvements have been made and consequently a brief description of the equipments actually installed may be of interest.

Systems Employed

Actually two types of phototelegraph apparatus were installed for service between Tokyo and Osaka. One of these was designed to operate, at high speed, over the open-wire telephone wire, while the other was intended for operation on the 4-wire repeatered cable circuit and for use in case of interruption of the open-wire line. The former was called No. 1 Set and the latter No. 2 Set, and in the following description the mechanism and operation of the two types are common except where particularly indicated.

Sending Apparatus

At the sending terminal a pulsating light flux is produced by interrupting with a rotating toothed wheel the light emanating from the source, as shown in Figures 1 and 2. The picture to be transmitted is mounted on a drum in such a way that the pulsating light flux is projected on it.

The light is reflected from the picture onto a photocell and causes a picture current to be transmitted. After the picture current is amplified, there is sent out on the line a carrier current modulated in accordance with the respective brightness of the original and with the lower half of the frequency band eliminated by means of a high pass filter. The frequency of the carrier current is about 6,000 cycles per second for No. 1 Set and about 1,700 cycles for No. 2 Set.

With this equipment it is possible to transmit photographs, manuscripts, certificates, etc., in suitable size without being subjected to any special preparation beforehand; the largest size of the picture that can be transmitted is double that of cabinet size, that is, 18 by 26 cm.

If a picture is transmitted from a negative film by a transmitted light, higher efficiency of the light utilization may be obtained, but for simplicity and convenience the equipment was designed to be adaptable to reflected light.

The pitch of the scanning spiral is six lines per mm. and the time required for the transmission of the full size of 18 by 26 cm. is about six minutes with No. 1 Set and about 20 minutes with No. 2 Set.

Receiving Apparatus

A 50-watt incandescent lamp is used as the light source from which light flux is projected upon the reflecting mirror of the vibrator. If a part of the vibrating light flux is cut ofl by a screen, a definite relation is established between the intensity of the remaining light and the amplitude of vibration of the mirror. Now if this remaining light is collected by lenses and projected upon the film or

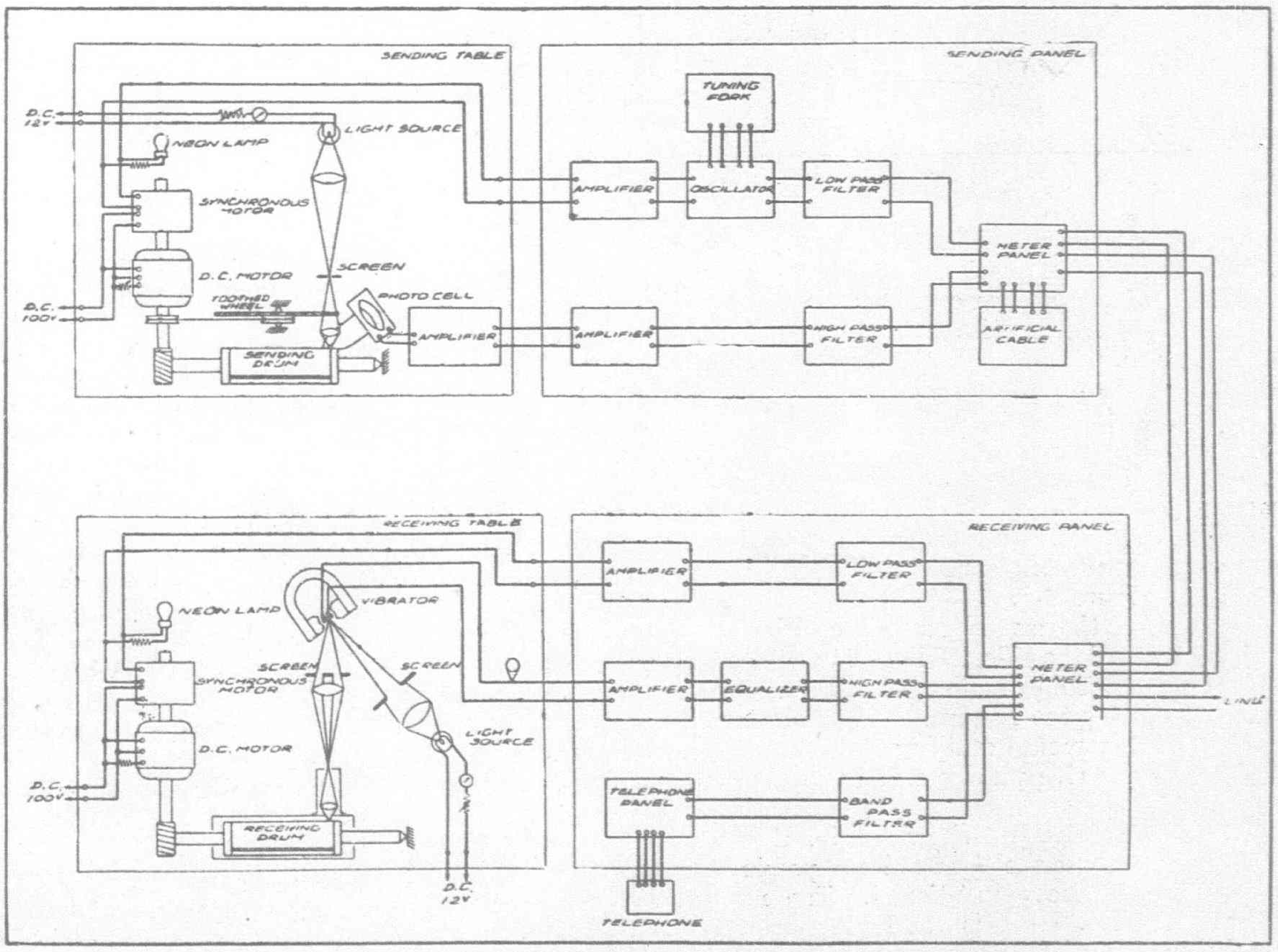


Fig. 1.—Schematic Diagram of No. 1 Phototelegraph Apparatus

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*Y. Niwa, "a system of Electrical Transmission of Pictures," *Electrical Communication*, April 1930.

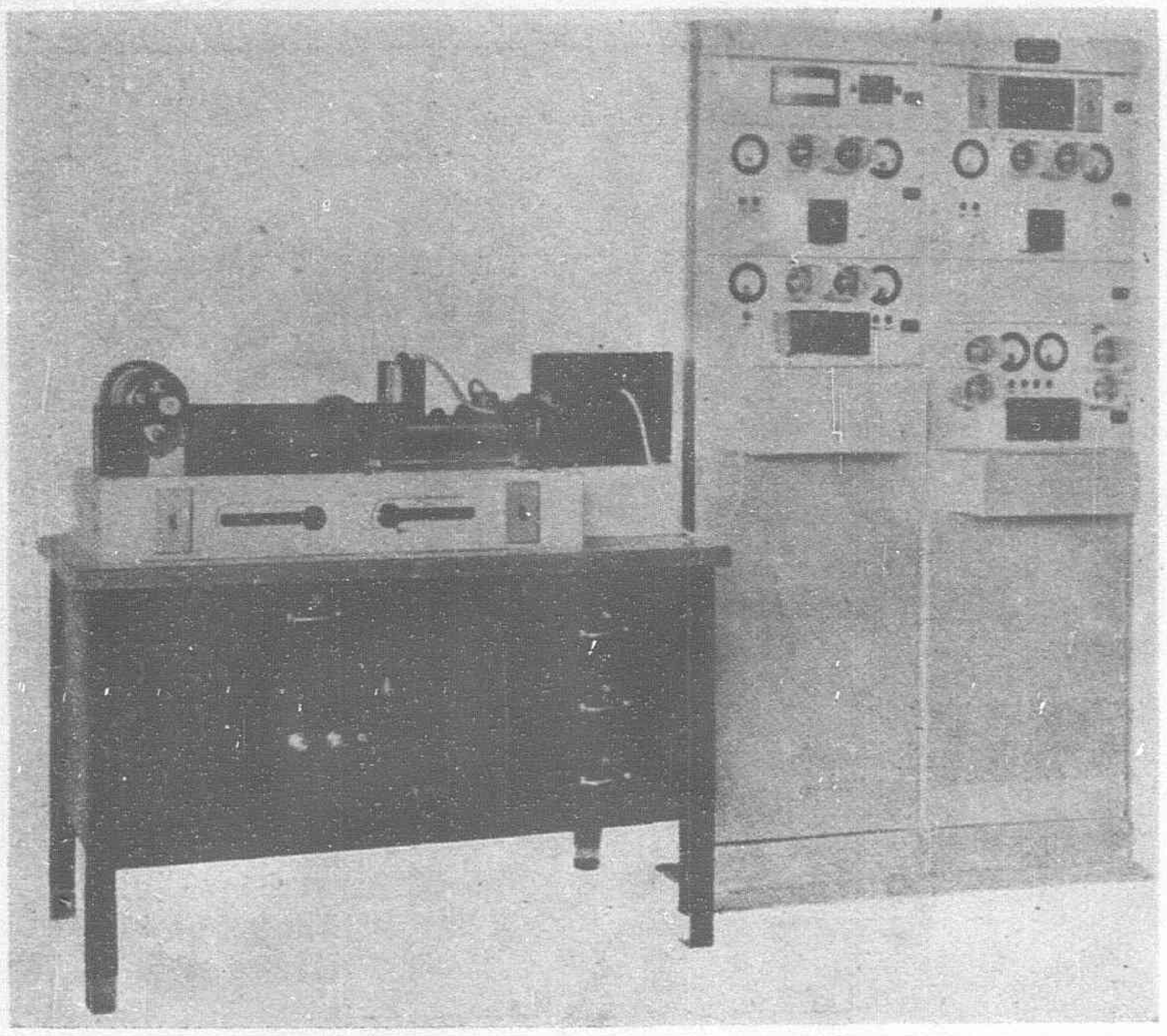


Fig. 2.—Sending Apparatus

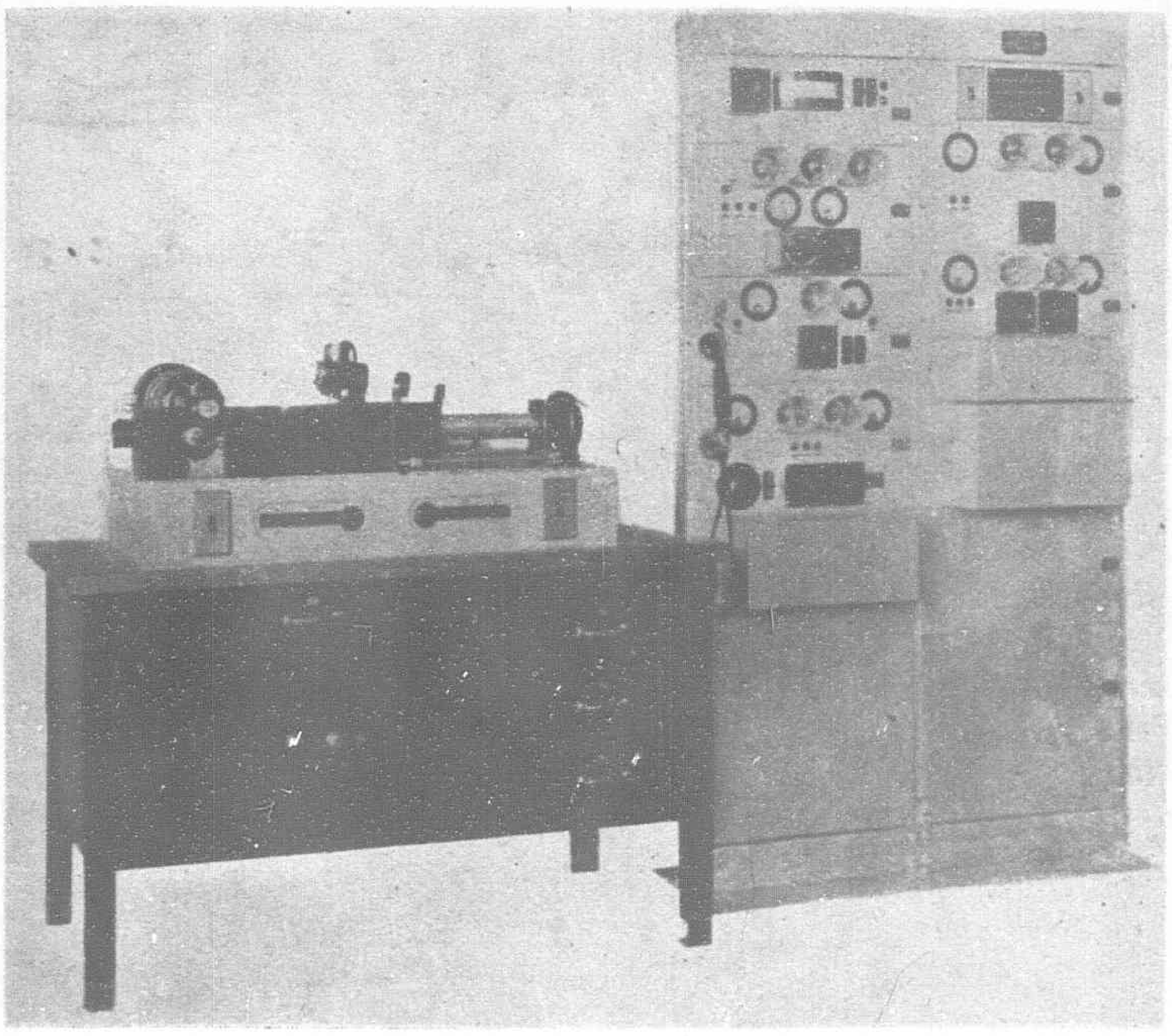


Fig. 3.—Receiving Apparatus

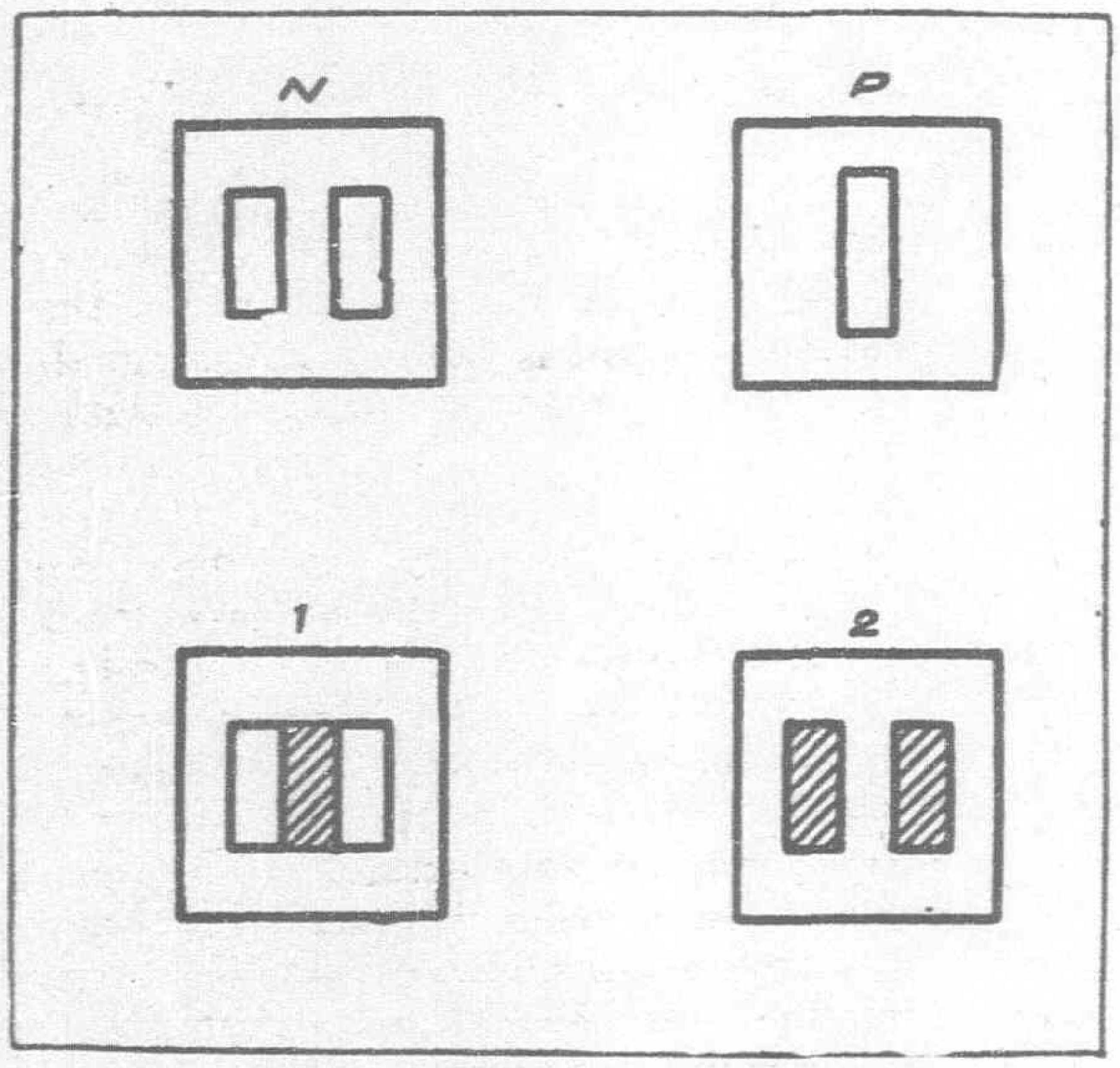


Fig. 4.—Intercepting Screen

printing paper mounted on the receiving drum, a spot of light, corresponding to the amplitude of the carrier waves received, is produced upon the sensitized film or paper. As the receiving drum operates in synchronism with the sending drum, the picture at the sending station can be completely received. (Figures 1 and 3.)

In the case of receiving a picture in negative film, a screen consisting of two square openings (Figure 4-N) is employed ; then the light spot reflected from the mirror is intercepted by the center of the screen, as shown by the shaded portion in Figure 4-1, when no current is flowing in the vibrator. If, however, a carrier current flows in the vibrator, the reflected light flux oscillates to both sides and passes through the right and left openings. As the larger the amplitude of oscillation the more will be the amount of the light passing through the openings, it is evident that the received picture will be in negative. In this case the optical part should be adjusted so that the deflected spot comes at its maximum amplitude, as shown in Figure 4-2.

Provided the screen has an opening at its central position (Figure 4-P), all the reflected light flux will pass through this portion. Now if current is flowing in the vibrator, it will be easily recognized that the greater the amplitude of oscillation of the light spot, the less will be the amount of light passing through the central opening ; therefore a positive picture will be produced upon the sensitizing paper.

Curves in Figure 5 show the relation between the deflection of the mirror and the light volume passing through the openings in both cases above mentioned. The natural frequency of the vibrator for No. 1 Set is nearly 17,000 cycles and for No. 2 Set nearly 6,000 cycles.

Synchronizing Device

A synchronous motor, which is directly coupled with a D.C. motor working from an independent source at the sending office, is used for driving the drum. These two motors, in conjunction with corresponding motors at the receiving terminal, drive the sending and receiving drums in synchronism. Synchronizing current is generated at the sending terminal by a tuning-fork oscillator. A part of the output from this oscillator is employed to drive the synchronous motor at the sending end, and the remaining part is sent over the line, superposed upon the picture current. These two currents, since they differ in frequency, can be easily separated by the aid of a suitable filter inserted at the receiving end.

For the No. 1 Set, a synchronizing current of 200 cycles per second is employed while for No. 2 Set, 300 cycles is used on account of the increased attenuation at lower frequencies in cable circuits.

For satisfactory picture transmission the sending and receiving drums should be strictly maintained in their corresponding positions during operation while keeping their speeds in synchronism. In this instrument, the driving apparatus is running continuously; the sending or receiving picture drums are arranged so that they

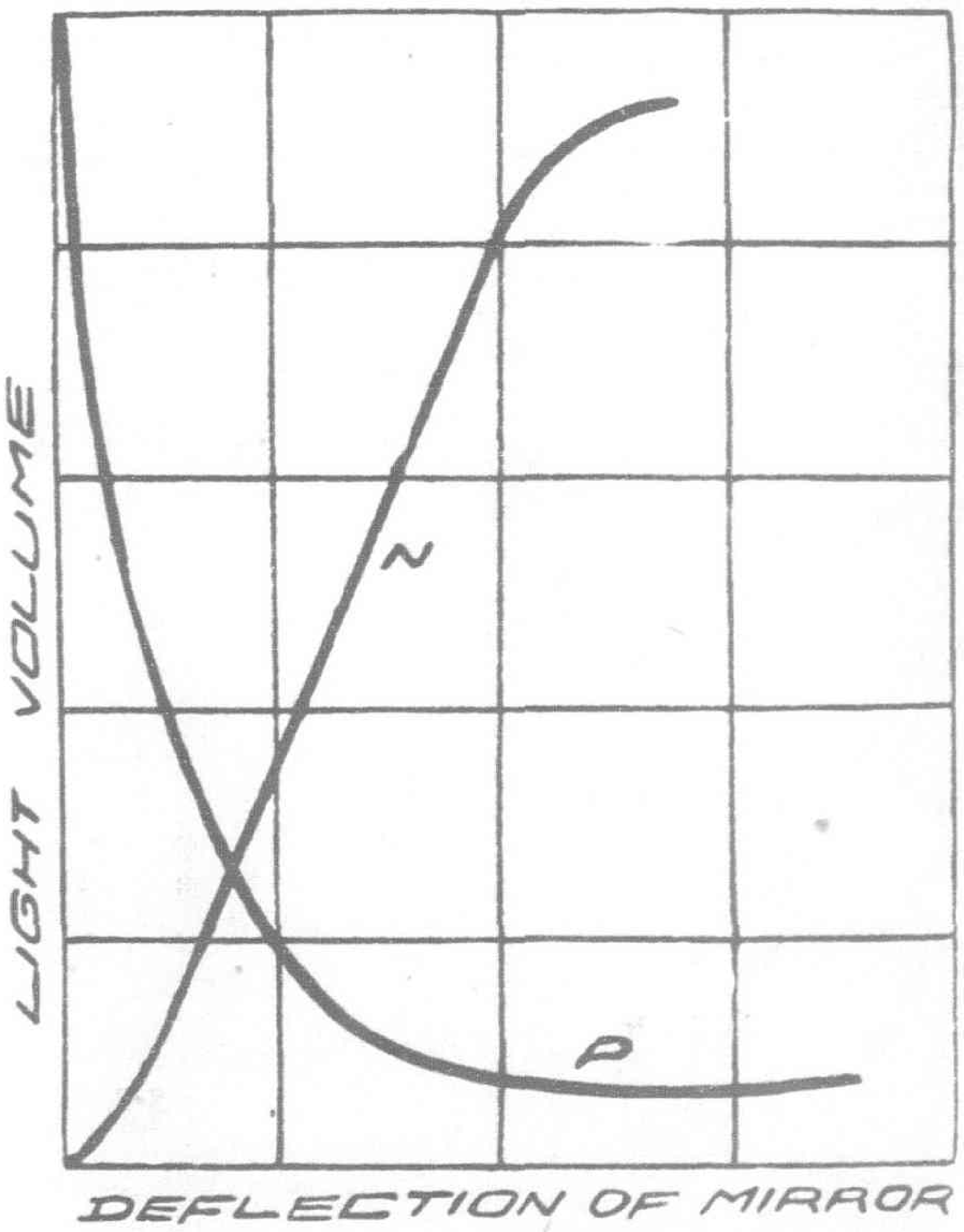


Fig. 5.—Relation between Deflection of Mirror and Light Volume passing through Openings of Intercepting Screen

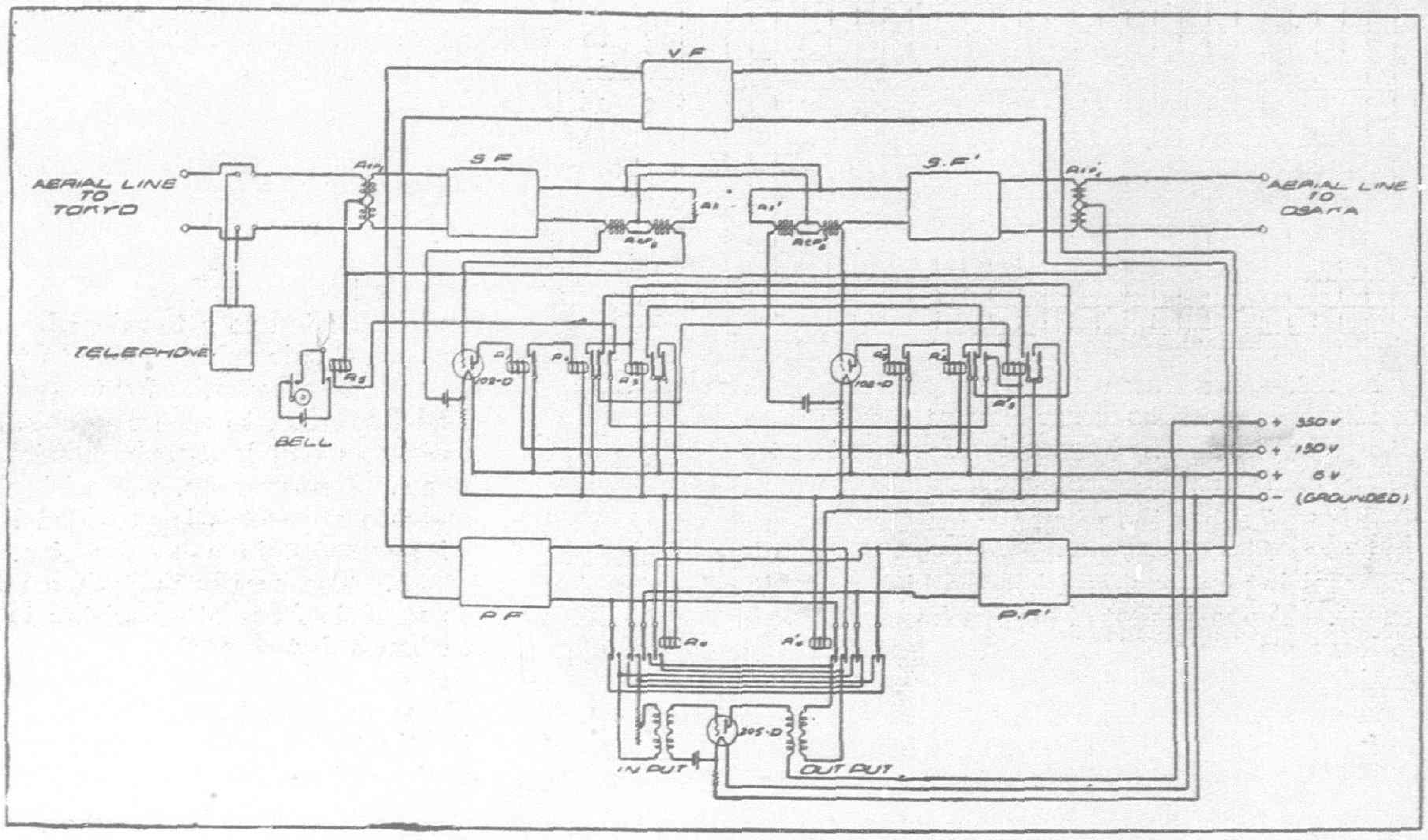


Fig. 7.—Schematic Diagram of Repeater

can be fitted on the driving shaft in their correct position during one revolution. Providing the speed remains constant, no matter how often the sending or receiving drums are started or stopped they will always be in the same relative positions. Hence it is necessary before starting to work, to ensure that the joint of the picture is in the correct position at the sending end as well as at the receiving end. This is done as follows: on the picture clip at the sending end is a white line, whilst the rest of the drum is black; on rotating the drum, without traversing it, a rush of picture carrier current indicating the white line will be sent to the circuit. At the receiving end the amplifier is switched so as to light a small neon lamp placed in the box; a tinted celluloid cylinder fixed on the same shaft as the receiving drum revolves round the lamp. If the drum revolves in coincidence with the sending drum, a black line on the celluloid cylinder comes to a hole of the box at the instant the neon lamp is lighted, therefore the light can not be seen when peeped at through the hole; if on the other hand a red or yellow light can be seen it is necessary to shift the phase in the proper direction by rotating the stator of the synchronous motor until the light is out of sight. This may be understood by referring to Figure 6.

Signalling System

Conversations over the line by the telephone apparatus provided with No. 1 equipment can be carried on even when a picture is being transmitted. If a signalling key is switched at the sending end so that the filament circuit of an oscillation valve is closed, a signalling current of approximately 1,000 cycles is sent out to the line. At the receiving end this current, after being separated from the picture or synchronizing current by a band pass filter cutting off below 300 cycles and beyond 2,000 cycles, is amplified, rectified and then passed to a relay which operates a bell. When the key is restored, the filament circuit is opened and the signalling current stops; the answering signal may be sent from the receiving end in the same manner. When the telephone receivers are removed from the hooks at both ends, the telephone circuit is closed so that conversation is possible.

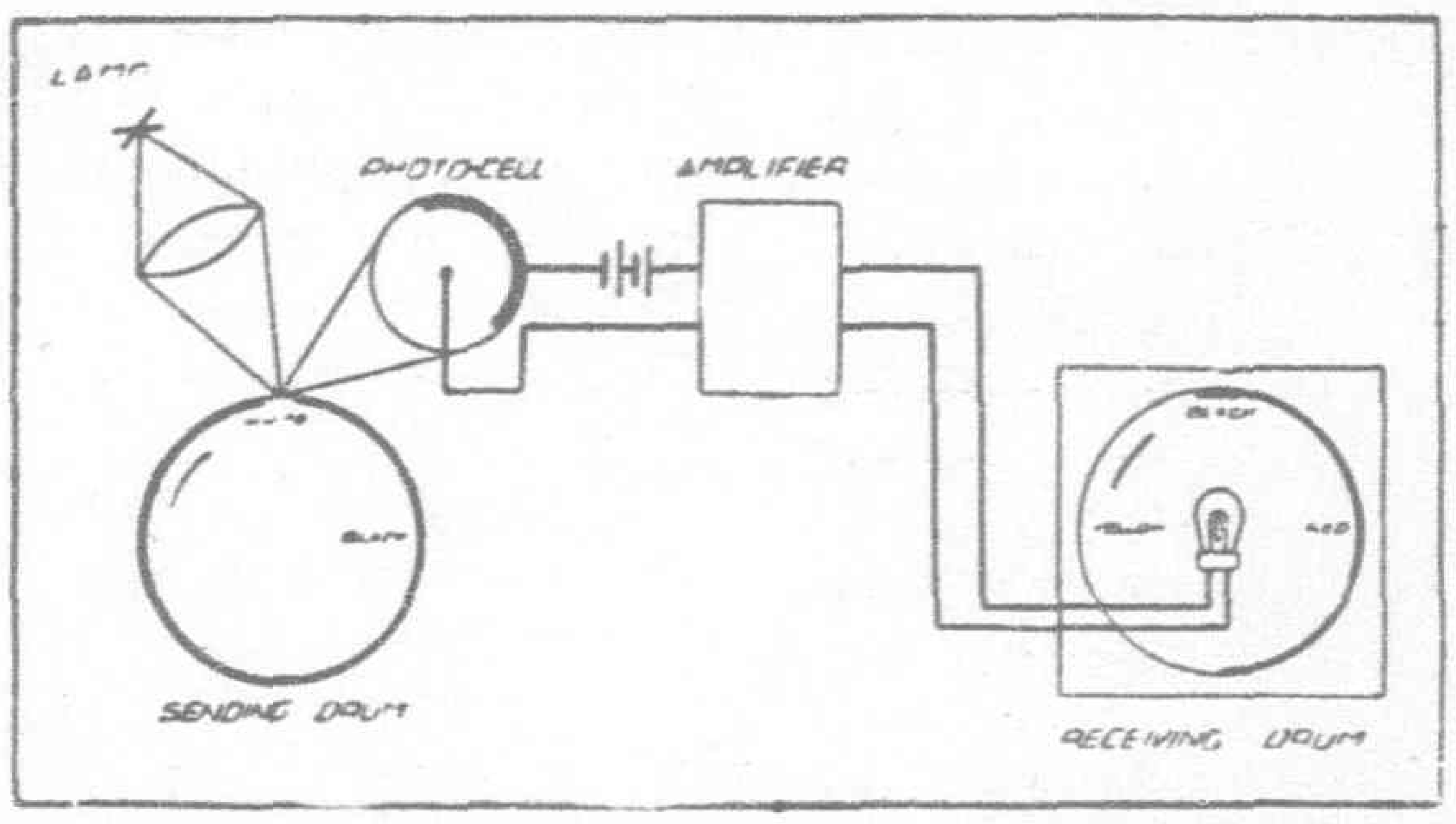


Fig. 6.—Schematic Diagram of method of adjusting Sending and Receiving Drum for Synchronism

In the case of No 2 Set, telephone apparatus fitted with a loud speaker is usually connected to the line and conversation can take place except when a picture is being transmitted. When the picture transmission is to be started the line must be connected to the photo-telegraphic apparatus instead of the telephone set by changing a switch, but listening can take place over one pair of the 4-wire cable circuit. While a picture is transmitted over the other. A carrier telegraph apparatus is also arranged for transmitting telegraph signals from the picture sending office to the receiving office without stopping the revolution of the motor.

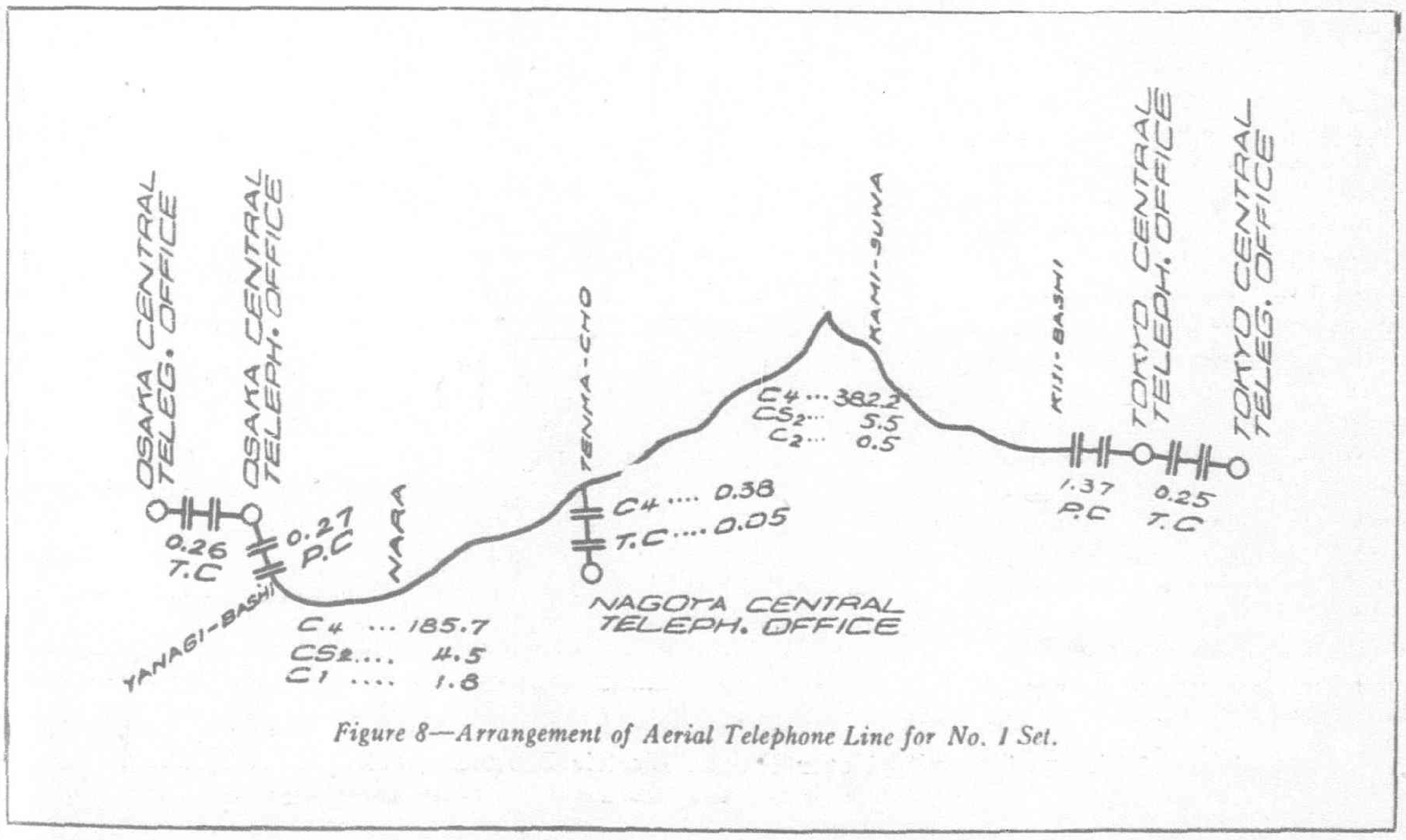


Figure 8—Arrangement of Aerial Telephone Line for No. 1 Set.

Repeaters

In the case of No. 1 Set, the maximum transmission loss of the carrier current on the aerial line between Tokyo and Osaka is estimated to be about 35 db., consequently a repeater was inserted at the Nagoya Central Telephone Office in order to amplify the current. This repeater was designed for one-way operation only and in order to save the trouble of manually changing the connec-

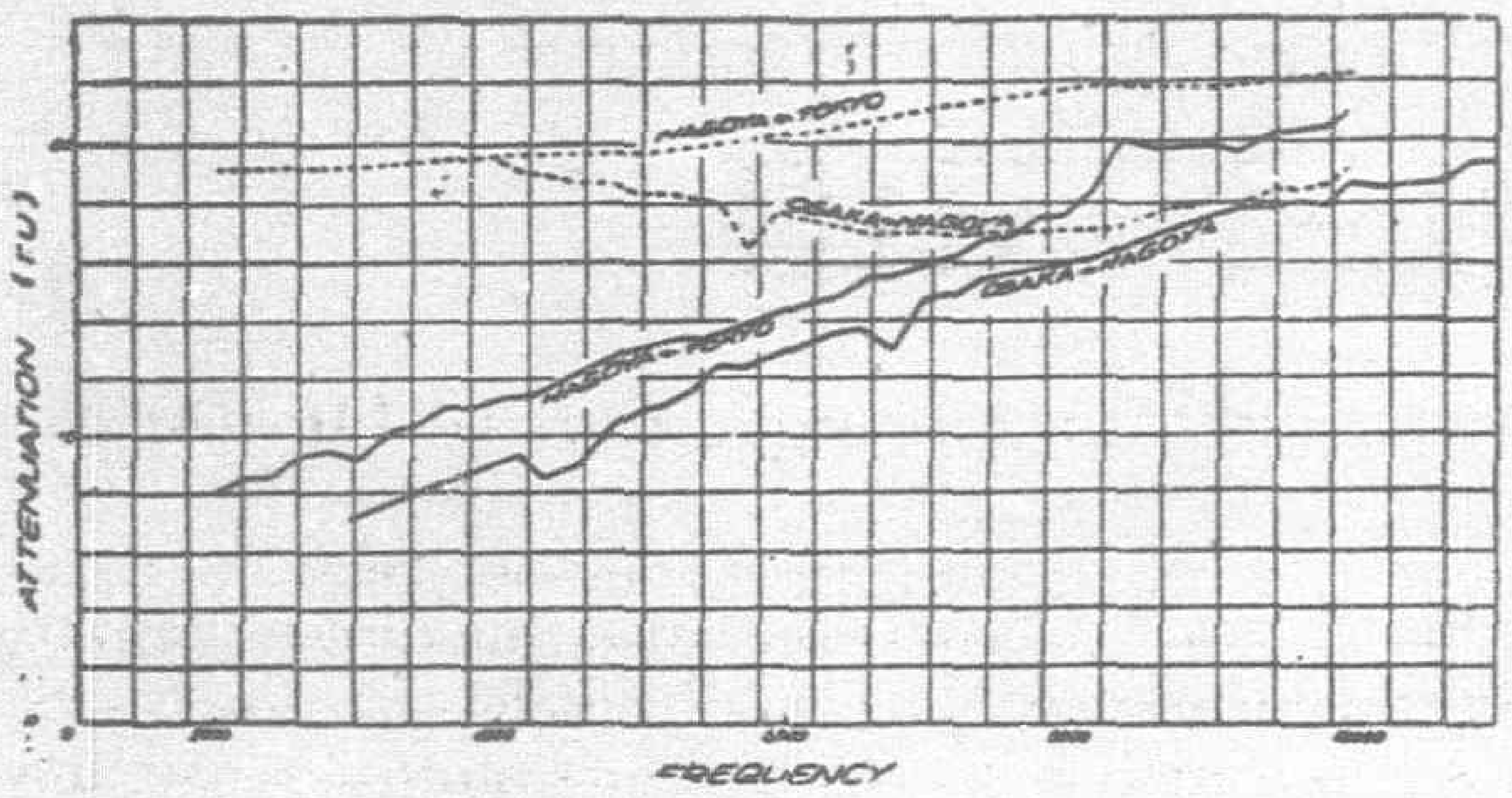


Fig. 9.—Attenuation-Frequency Characteristics of the two sections Tokyo-Nagoya and Nagoya-Nagasaki

tion according to the direction of the picture current, an automatic changing system was devised utilizing the synchronized current transmitted from the sending office.

Figure 7 shows the schematic diagram of the repeater. VF is a band pass filter for the voice current, SF the low pass filter for synchronizing current, and PF the high pass filter for the picture current. The main part of the synchronizing current passes through the low pass filters SF, SF′, and is sent to the receiving end ; the remaining part is rectified by the 102-D valve and operates the relays ; with the result that when the relay R4 or R4′ is operated the input terminals of the amplifier are connected to the sending side and the output terminals to the receving side. The gain of the repeater is about 25 db. for the 6,000 cycle carrier current. The synchronizing current and the voice current are not amplified in this repeater because their transmission losses over the line are comparatively small. Figure 9 gives the attenuation-frequency characteristics for the two sections Tokyo-Nagoya and Nagoya-Osaka.

As to No 2 Set, 4-wire repeaters are installed at Yokohama, Ejiri, Toyokawa Kameyama, and Osaka on the cable circuit. The resulting attenuation between Tokyo and Osaka is about 8 db.

Line Arrangement

The arrangement of the aerial telephone line for No. 1 Set is shown in Figure 8, the length of which is about 600 km., and chiefly consisted of 4.00 mm. copper wire. The use of other kinds of wire was avoided as far as possible in order to keep the characteristics of the line smooth and constant, that is, they must not vary appreciably throughout the transmission range and transmission must be free from echoes and other irregularities.

This line was carried by the same poles as the private toll line of the *Nippon Dempo Tsushin-Sha* on which picture transmission by the Siemens system (6,500 cycle carrier current) is operated betwerr Tokyo and Nagoya. In order avoid inductive interference an cross-talk between the two circuits, they were separated as far as possible on the pole route and frequent transpositions were made.

Power Plant

The main parts of the phototelegraph system are fed by storage batteries,. *i.e*, 6-v. for the filaments of tubes of the picture and synchronizing amplifier, 2-v. for the filaments of the photocell amplifier tubes, 12-v. for the scanning lightsources, 100-v. for the driving D. C. motors, 50-v. for the plates of the photocell amplifier tubes and 350-v. for the plates of the picture and synchronizing amplifier. The photoelectric cell in use, made by the Tokyo Electric Co., is a flat ype gas filled potassium cell with a diameter of about 6 cm., the cathode being deposited with potassium hydride. The anode of the cell is connected to a 120-v. dry battery.

Precautions of Installation

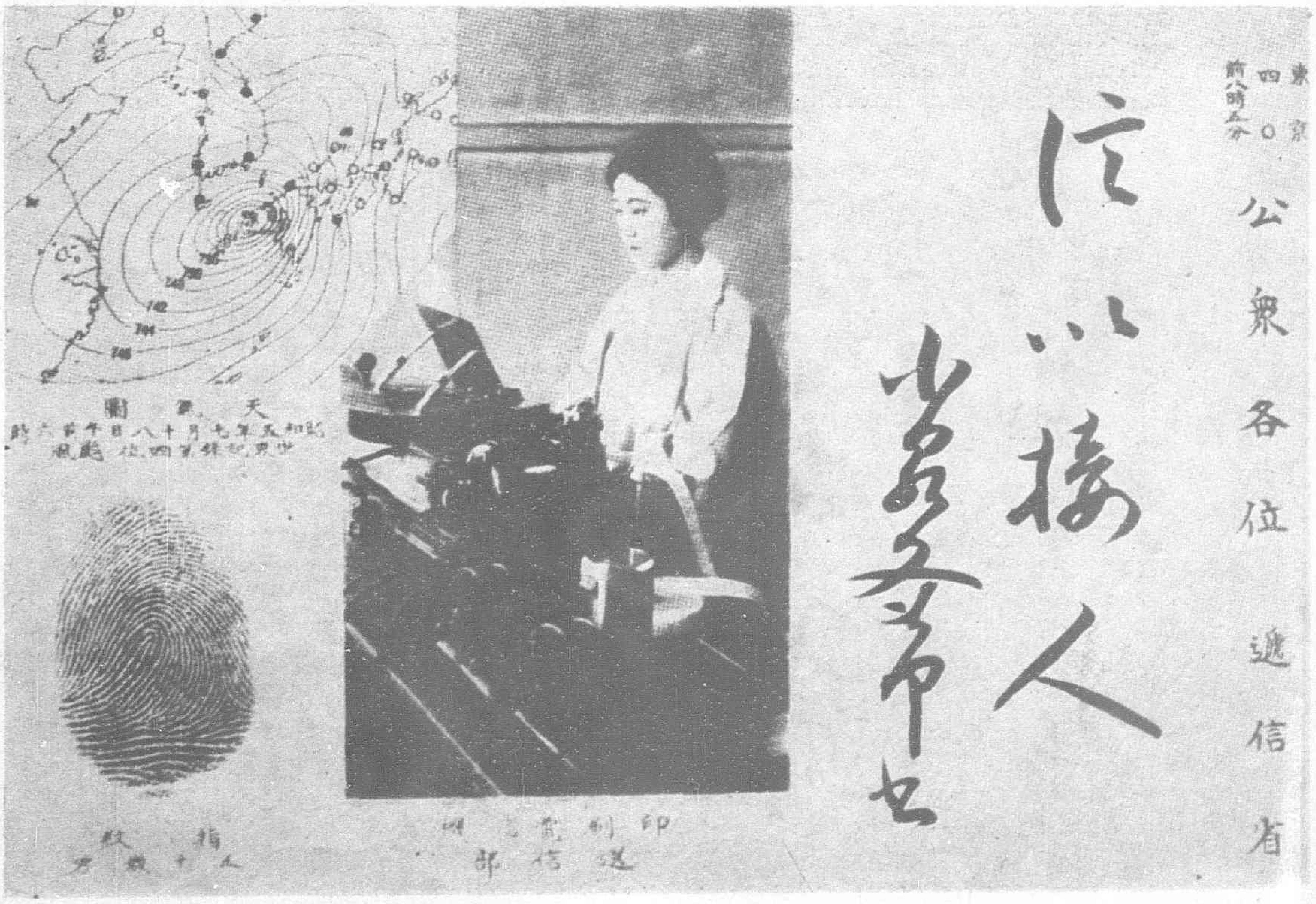
From the point of view of obtaining the best quality in the received picture, great care has been taken in installing and wiring, especially as to the following points :

1. The line is led into the central telegraph office through a 12-pair lead-covered paper cable from the central telephone office and connected to a terminal board and then by means of a lead-covered 2-pair rubber cable to the apparatus.
2. The batteries for the photocell amplifier are enclosed in a lead lined box to secure perfect shielding against extraneous disturbances and lead-covered wire is employed to the distributing panel. Furthermore, the wiring between the distributing panel and the apparatus is provided by a high grade rubber insulated wire guarded in a copper pipe.
3. The supply mains from the battery are separated as far as possible from other wiring in order to prevent induction disturbance between them.
4. The leads to the apparatus from the batteries for the filaments, the plates of picture and synchronizing amplifiers and the lightsource are high grade rubber insulated wires protected by an iron pipe. Similar precautions have been taken in the case of the wiring between the sending and receiving apparatus.
5. All the wire is separated carefully from power and lighting circuit.
6. Care is taken to minimize the electrical resistance of the joints of iron or copper pipes and each pipe section is perfectly earthed.
7. Oil layer is used to keep the storage batteries free from acid spraying.
8. Special design is provided in the dark room for close shutting of light, ventilation, supplying and draining water, illumination, doors, double windows to hand over phototelegrams, and voice tubes.
9. Developing and printing can be done by convenient arrangements. Special dryer and washer are also provided.

Service

On the opening day of the public service, nearly 70 phototelegrams were accepted, most of which were in the nature of demonstrations, such as new fashions in dresses and trinkets, samples of goods,

(*Continued on page 766*)



Specimen of Picture transmitted over Nippon Electric Phototelegraph System between Tokyo and Osaka

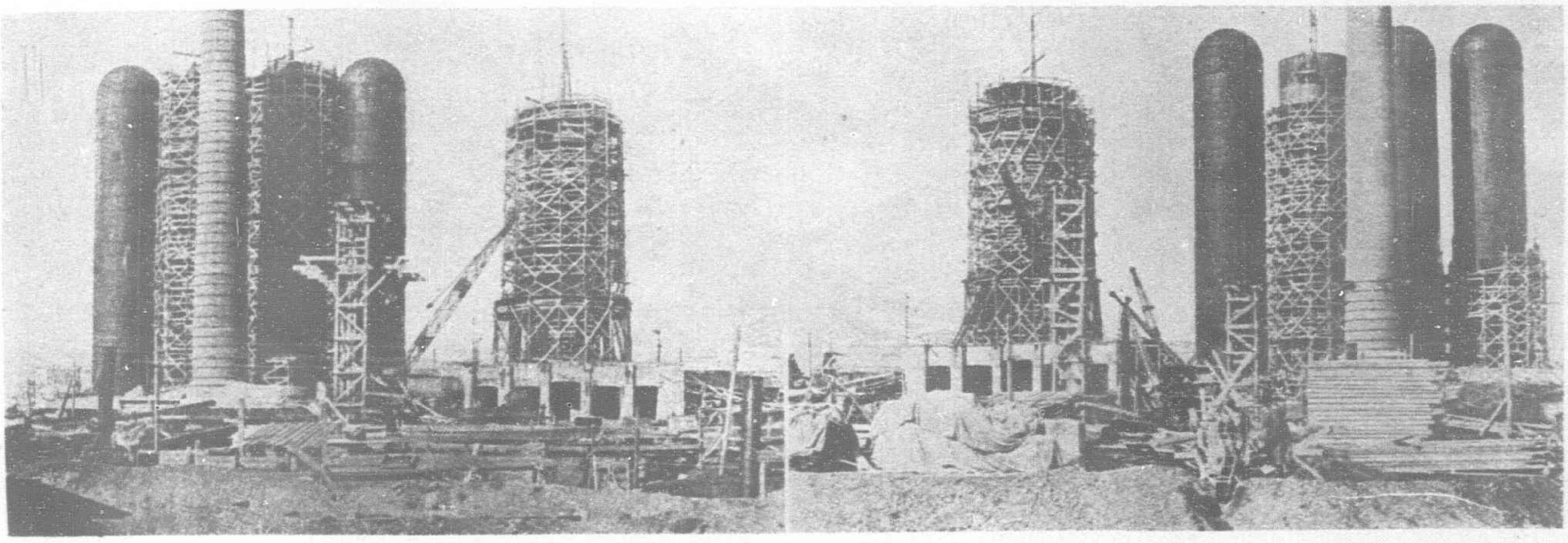
The New Soviet Steel Mill

Progress of Construction at Kuznetsk. First Units of this Siberian Steel Plant being put into Operation

KUZNETSKSTROY, the modern steel plant being built at Kuznetsk, Siberia, is now well under way and the first units rapidly nearing completion.

It is expected to blow in the first blast furnace late this fall. When completed, this plant will consist of four blast furnaces with a total daily capacity of 3,500 tons, four batteries of coke ovens, 15 150 ton open hearth furnaces, two blooming mills, rail and structural mill, plate billet mills, merchant and other types of finishing mills. It also includes a central electric generating plant with an ultimate capacity of 96,000 kw., a pump house on the River Tom, 4 mi. from the plant, a brick yard, foundry, machine shop, boiler shop, forge shop and other miscellaneous shops. The design and construction of Kuznetskstroy is being supervised by Freyn Engineering Company, this company maintaining a force of 46 engineers at the plant site.

A complete modern town is being constructed, providing for a permanent population of 50,000. Some idea of the magnitude of the work involved in the construction of this project can be obtained when it is realized that 4,600,000 cu. yd. of grading and excavating are involved in the completed steel plant alone. A temporary town of 90,000 people now exists where two years ago there was practically a wilderness. Out of a total of 37,000 workers, 8,000 to 9,000 are employed on the steel mill proper, the remainder being engaged in quarries, brick plants, saw mills, coal mines and in road building, housing and the development of accessory manufacturing projects.


Progress on Nos. 1 and 2 Blast Furnaces, March, 1931

Work is being concentrated at the present time on two of the blast furnaces, the coke plant, six open hearth furnaces, one blooming mill, the rail and structural mill and the various shops required for the operation and maintenance of the plant.

No. 1 blast furnace is nearly completed, while on No. 2 furnace there is still some plate and structural work to be done. No. 1 furnace was lined up to the tuyeres on August 1, and the brick work is being laid up in three of the stoves. Downtakes, bleeders, bustle pipe are completed on No. 1 furnace.

The erection of the skip bridge is now well under way. Scale cars, skip hoist and top are in process of erection and it is believed that this furnace will be complete and ready for drying out by October 15. The three stoves which are being lined will also be completed by October 15, indicating the furnace proper should be in position for lighting early in November.

The river pump house is well along, the intake being complete and the pumps set in place ready for grouting. Approximately 3,800 yards of wood stave pipe have been laid, leaving 3,200 yards to be placed to connect the pump house with the plant. Service pumps are in place and pump headers are now being erected. Water lines to the furnaces are installed, leaving only the connection to the service pump house to be completed.

The turbo-blower house is completed and the erection of the turbo-blowers is in progress. The boiler house building is practically finished and the erection of No. 1 and 2 boilers is progressing at a rate which will permit operation early in October. Erection of one 6,000 kw. and one 24,000 kw. turbo generator is proceeding at a rate which will permit their being tested out and placed in operation during the month of October.

In the open hearth plant, work on the first six furnaces is progressing satisfactorily. Furnaces No. 1 and No. 2 are being bricked up, binding and steel work for No. 3 and No. 4 in place and the foundations ready for No. 5 and No. 6.

The soaking pit building is practically completed, the binding is set up for the pits, and brick work is well under way.

The blooming mill building is practically completed and concrete is now being poured for the mill foundations. Work is progressing on the rail mill building and on the mill foundation and excavation has been started for the rail finishing building.

Several of the shops are now in operation, the foundry building is 50 per cent complete and the 5 ton cupola has already been placed in operation.

In the brick plant, one 18-chamber kiln has been completed and has been burning chamotte since the first of August, and the manufacture of firebrick will soon be started.

The original date set for the first iron to be cast was in October, and in view of the tremendous handicaps to be overcome in the construction of the plant, it is pleasing to note that the first blast furnace will come very close to meeting this schedule.

The illustration at the beginning of the article shows the condition of the furnaces and stoves on March 31.

Developing China's Northwest

Mr. Ma To, representing the North-western Industrial Corporation newly organized by General Yen Hsi-shan for the development of the North-west, arrived at Nanking recently from Shansi in connection with the registration of a new Corporation with the Ministry of Industry and other legal details.

In an interview, Mr. Ma stated that the Corporation, which is capitalized at $12 millions, will endeavor to develop the North-west chiefly along four lines: cattle raising, coal-mining, cotton spinning and weaving, and the fur and feather industry. These are to proceed in accordance with the program of industrial development for the North-west formulated by General Yen, who is the chief promoter of the project and who has subscribed $3 millions towards the capital. It is believed that the necessary official sanction from the Ministry of Industry will soon be obtained.—*Kuo Min.*

Chinese Automotive Market Conditions*

First Half of 1931

Trade Commissioner A. VIOLA SMITH, Shanghai

(The information embodied in the following article was assembled prior to the great floods that have devastated the Yangtsze Valley regions, and prior to the Sino-Japanese difficulties in Manchuria. Consequently, the market conditions prevailing in those parts of China during the first half of the year must be considered now in the light of recent events.)

CHINA, like other countries, has felt keenly the effects of the world-wide economic depression, but probably the most unfavorable factor has been a reduction of approximately 50 per cent in purchasing power resulting from the low silver exchange levels of the past 18 months. The adverse effects on the automotive trade are reflected in a decrease of 36 per cent in the net imports of cars and trucks into all China during the first quarter of 1931 as compared with the same period of 1930.

General Conditions and Seasonal Factors

Sales of both passenger cars and trucks in China are confined to low-price models. Certain popular medium-price American cars have maintained their 1930 level, but other medium and high price lines have sold exceedingly slow. All areas are suffering from the low levels of silver exchange, but Manchuria in addition is handicapped by the poor European demand for its products. North and Central China are experiencing a lack of demand for motor vehicles among the military and Government organizations. South China has fared somewhat better with the opening of Kwangsi Province after a year of civil and military strife ; demand there has been fairly brisk for automobile accessories, parts, and tires with which to rehabilitate the motor-bus service.

In Manchuria no improvement in economic conditions is expected until after the next harvest, and any betterment there will depend largely on increased prices for Manchurian export commodities and on higher silver exchange. In Mukden the principal buying season for automotive equipment has just closed (July,1931), and only small sales can be expected until next spring. In Harbin the principal buying season begins in October, hence no improvement can be expected until that time. Dairen sales are uniform practically the year around.

North China sales approximated only 75 units of all types during the second quarter, but the tendency in the Tientsin area during June for buyers to become reconciled to the high prices necessitated by exchange makes prospects for the third quarter there somewhat brighter, particularly in the case of passenger cars where the principal demand is for American models.

The Shanghai market is dependent on higher exchange and on the development of motor-bus transportation in Central China. No immediate signs for larger sales are present, though a more confident note among dealers is seen.

South China is dependent on the political situation prevailing in Canton. Should this remain quiescent, the opening of Kwangsi Province augurs well for additional inquiries, and the highway-construction program in Kwangtung Province should furnish impetus for better sales in that region. Hong Kong sales are definitely restricted by the depreciated currency.

The automotive market in its different lines, as affected by fundamental conditions in the main market regions, in considered in the succeeding paragraphs.

Stocks as a Trade Barometer

Of the three principal distributing centers—Shanghai, Dairen, and Hong Kong—Shanghai in its stocks offers a fair barometer to the China trade, as two very large American automotive manufacturers maintain there their own export organizations and warehouse stocks for the benefit of their dealers throughout China.

Dairen is the entrepôt for Manchuria, and Hong Kong serves similarly for South China. Both places, being free ports, offer certain facilities and advantages which traders are quick to utilize. For instance, an American concern with headquarters at Tientsin, but with branches throughout North China and Manchuria, is carrying stocks at Dairen in preference to Tientsin ; for, if a motor-truck chassis is brought into Tientsin and re-exported with a locally built body to another Chinese port, the importer pays not only the original import duty into Tientsin but also another at whatever other Chinese port it may enter.

Present Shanghai stocks are below normal, dealers' purchases being held to minimum. Stocks of European cars and trucks are estimated at approximately 150 units, and American cars and trucks of all types between 350 and 500 units. Stocks of European cars have been slightly increased, owing to the opening of new show rooms by the Italian Fiat, the entry into the market of a new small German car (D. K. W.), and a more intensive sales campaign by two concerns handling the French Citroen and Renault.

Manchurian stocks of all classes, especially trucks, are considered too high for present market requirements. Some dealers are still holding stocks of 1929 models, which are being offered at the old selling price in silver currency (approximately 50 per cent of their 1929 gold value) in order to clear. Tientsin stocks are normal, being estimated at 100 passenger cars and 200 trucks. Hong Kong stocks are medium.

Selling Points, Advertising, and Exhibits

The First National Good Roads Conference and Exhibition at Shanghai is to be held from September 12 to October 2, 1931, in which considerable interest is being displayed by British and European manufacturers.

The Morris organization is facilitating purchase of Morris cars by Englishmen in China, for use during "home leave"—offering a home driving license, home registration, insurance, a membership in the Automobile Association or the Royal Automobile Club, and delivering the car anywhere in Great Britain.

American cars dominate the market and competition from foreign makes has never been a really serious factor ; but recently there has been a marked tendency in the Shanghai market on the part of dealers in French, German, and Italian makes toward a more intensive sales campaign and a larger advertising display in the local press.

An active advertising sales campaign has been launched by the agents for Renault, and a new show room has been opened on the Bubbling Well Road. On the same avenue a smaller show room has been established by the Citroen. Peugeot's re-entrance occurred during May under a Sino-American agency, but apparently no sales have yet been made. A new small German car (D. K. W.) appeared in the Shanghai market during June, with some 8 or 10 cars on display. The new show rooms at the Auto Castle on Bubbling Well Road can accommodate 45 cars on the floor ; its opening on July 19 was the occasion for a showing of Fiat cars.

Used-car Market—Import Restrictions—Types in Demand

In the Shanghai market used-car turnovers have been exceedingly brisk, owing to the extremely high prices at which new cars are selling. In Manchuria no used-car situation existed prior to 1931 ; but lately taxicab owners have been unable to meet installment payments, and a few passenger cars have had to be repossessed. In North China there is very little business in used cars.

The increase in import tariff (effective January 1, 1931) from 22½ per cent to 30 per cent on passenger cars, plus the fact that the customs duties are collected on a gold basis, has has a deterrent effect on passenger-car sales ; but dealers feel that this situation would not be a great burden, were silver exchange at its normal rate.

**Commerce Reports.*

China, always a low-price market, is more so now than ever. A few medium-price and high-price cars are sold in Shanghai and other large treaty ports, but such sales have been few and far between in recent months.

In motor trucks the demand is for low-price 1½ to 2 ton models. In Shanghai and one or two of the large treaty ports there is an occasional demand for 3 ton trucks, but dealers rarely stock heavy models. As 90 per cent of China's highway system is composed of dirt roads, heavy trucks are impracticable outside of the treaty ports where good asphalt roads exist.

Body types vary according to local requirements. No bodies are imported, as local bodies can be built cheaply, and chassis take a lower duty than the completed truck with body.

The Truck Market—New Uses for Trucks

The outstanding feature in the motor-truck market in China is undoubtedly the completion during June of the first China-made motor truck. This is an assembled product, turned out by the Industrial Works of the Liaoning Trench Mortar Arsenal at Mukden after 18 months of research, design, and manufacturing (see *Commerce Reports*, December 29, 1930, p. 801).

Competition between American and European makes of trucks is usually not severe. In Manchuria practically no sales of foreign makes were made during the second quarter, but competition between American makes has been very severe. A Mukden agent has on hand approximately 40 used trucks which were repossessed at considerable loss. The same condition prevails in North China, where bus companies and transportation companies have been unable to meet their installments. The used-truck situation has recently become a sales problem in this territory, much more so than the used-car situation.

In Shanghai there appears to be a greater tendency to utilize trucks for transport of school children and employees and for hauling, though registrations do not increase rapidly. The use of armored trucks is expanding among Chinese banking institutions in Shanghai within recent months. These trucks have been locally constructed and for the most part are mounted on American chassis. One American dealer has built two armored motor trucks for military use in Chungking, Szechwan Province.

In Tientsin an interesting type of truck is now nearing completion. A Morris commercial British Army truck equipped with six wheels (the rear wheels mounted on two separate axles and with two transmission gears), is being fitted out for an expedition to Sinkiang Province (Chinese Turkestan). Tracklaying belts can be fitted over the four rear wheels and thus make the truck into a tractor. A steel center cable is included for pulling other cars out of difficulties. Trial tests are said to have been very successful.

The Bus Market

Bus chassis requirements, with the exception of busses operated by two foreign public utilities companies in Shanghai, are served by truck chassis. In bus bodies there is a tendency in the Shanghai area toward improvement in locally built types, but the best of these do not approximate the bodies to which Americans are accustomed. Imported bodies are prohibitive in cost. In bus designs there has been no improvement throughout Manchuria. The medium-weight truck chassis and locally made body meet requirements. All busses are built on American-truck chassis.

Competition between American and European makes is usually not severe. One recent sale of Renault trucks to the local Wu-non Bus Co., Nantao, to replace equipment lost by fire during April, has created comment, as it is reported to have been made on very liberal credit terms. In the Tientsin area a limited business was done during the quarter, entirely in American light low-price lines.

Bus Services and Routes

In Manchuria the recent economic decline, together with the tariff increase at the beginning of the year which raised operating costs above revenues, has compelled several companies to take their busses out of service and put them in storage until conditions improve. Nevertheless, the *Manchuria Daily News* reports that the South Manchuria Electricity Co. (motor-car department) contemplates extending the Dairen-Chinchou bus line north about 30 miles to Pulantien, making the run in about 1¼ hours for a fare probably only 5 sen more than the corresponding third-class railway fare. This would give direct bus service of 55 miles from Dairen to Pulantien and, with the 35 mile line from Dairen to Port Arthur, would provide a north-south trunk line across the Kwantung Leased Territory. The highway from Port Arthur to Dairen is completely paved, and also a large part of that between Dairen and Pulantien.

In North China no new routes have been established. Out of Tientsin 18 bus lines are operating with one to four cars each—a total of 42 cars by all companies.

The Shantung provincial authorities have taken a renewed interest in motor-bus transportation, but, generally speaking, the restrictions and taxes imposed militate against operation by private interests. All private roads in Shantung were taken back by the provincial road bureau during February. Bus services now operate on a joint-account basis, all private companies paying 40 to 50 per cent of income to provincial authorities. The right reserved by the provincial road bureau to order private companies to shift their rolling stock from one route to another is said to be working a great hardship on the operators.

In the Tsingtao area of Shantung Province, higher taxation on motor-bus companies has had a most depressing effect; of the 128 busses operating two years ago, only 65 are now said to be functioning. Present taxation rates there are reported to be: Light American-type truck, $50 Mexican for three months; 4-cylinder bus, $60 Mexican per quarter; 6-cylinder bus, $70 Mexican per quarter. In Taian bus operators are charged $5 Mexican per day per bus, or $150 Mexican per month per bus. One company which had 17 busses operating in the Tsienan area is reported to have laid up 12 on account of excessive taxes, keeping only three in service.

In Kiangsu Province a private company has been given the monopoly to operate a regular motor-bus service from Nanking to Chekiang border. A service over the first section, from Nanking to Kuyung, was inaugurated during May, and the opening of remaining sections awaits only the completion of road surfacing. Beyond the border as far as Hangchow, bus services have been operating for a year or more. The projected through traffic over this entire route, planned to begin August 1, 1931, carries considerable significance, since it will connect the national capital at Nanking with Hangchow, the provincial capital of Chekiang Province.

In Greater Shanghai, five companies are operating 97 busses in the Chinese-controlled area, and the bureau of public utilities operates a one mile service from its ferry landing on the Whangpoo or Kaochiao opposite Woosung. In the foreign settlements, two foreign companies hold the franchise for bus operation: The French Tramways, with approximately 22 French busses, in the French Concession; and the China General Omnibus Co. (a British concern), with approximately 110 busses, in the International Settlement.

In Szechwan Province the military and political disturbances have interrupted many of the operating companies.

The Motor-cycle Market

In all China, including Hong Kong, there are estimated to be only 2,461 motor-cycles. During 1930 the number increased by only 42 machines. In 1931 the imports into Dairen have reflected a better tone in the trade, 107 cycles having been brought in during the first five months of the year in contrast with 121 during the same period of last year. Imports into Shanghai decreased greatly, only 42 machines having arrived as against 119 machines during the 1930 period. In Tientsin no motor-cycles were imported during the first quarter as compared with 12 during the 1930 quarter.

Competition in motor-cycles is the reverse of that in motor-cars and trucks, sales of British and German machines outstripping the American makes. In Manchuria the American business has been done almost entirely by one well-known make, and mostly with Japanese military and police organizations which have standardized on that make. British motor-cycles are represented by numerous dealers, selling only to private individuals and at considerably lower prices than American makes receive. Business has been steady and seems on the upward trend for police purposes, but demand for private use has not improved on account of poor highways. Side-cars are generally used by the police, but rarely by private cyclists. The high-powered, superior-quality American motor-cycle is preferred by police departments, but private owners prefer the low-price British machines of medium power.

In North China the demand is normally extremely small. Price is probably the most important factor, and the German machines appear to be the most popular. One new agency was arranged for an American motor-cycle and two demonstrators were ordered from the manufacturer. The few German sales during the quarter were from consignments to Tientsin.

Replacement Parts and Accessories

Generally speaking, American parts are used throughout China, as American cars dominate the market; but certain European lines that are adaptable to American cars do a large share of the business on account of price advantage. However, the total is so limited that no large efforts are expended towards increasing this business.

Throughout Manchuria sales of automotive accessories during the second quarter were stagnant, in sympathy with the automotive market. Increases in duties, effective the first of the year, and in silver exchange, have raised prices to such a level that only the most essential accessories are purchased.

In North China there has been no change in demand, except that silver exchange has necessitated lower-price substitutes. The market for replacement parts, accessories, etc., is highly competitive. Under present practices, each agent or importer usually carries replacement parts for the particular brand of car that he handles. Operators of vehicles usually have all repair work done and obtain all replacement parts through the original dealer, most of whom obtain parts, etc., through some arrangement with the manufacturer of the motor-car. There is only a limited independent business in replacement parts.

In Tientsin there has been some increase in local production of parts, but naturally restricted to the less technical lines. One local shop, now manufacturing about 300 pistons a month, is seriously cutting into the business. These pistons, though not equal in quality to imported lines, are able to retail at 50 per cent of the latter's price. Other materials being manufactured include springs, body hardware, and wind-shield glass.

The Shanghai market has ruled steady, with perhaps a slight increase in demand owing to the fact that purchasers affected by silver exchange have made repairs to their old cars rather than purchase new ones at the high prices ruling. In April the contracts for 16 motor-cycles with side-cars (Sunbeams and Ariels) for use by the municipal police, were awarded to the Imperial Chemical Industries (China), Ltd. Heretofore this equipment has consisted of American makes.

In Central and West China there is a steady but limited market for automotive equipment, accessories, and replacement parts (according to Consul-General Lockhart). The business is largely in the hands of agents of leading automobile dealers, to whom purchasers naturally turn for repairs and replacements. This condition exists despite the fact that agency franchises of certain makes of cars carry with them the obligation on the part of the agent to sell only the parts made by the manufacturer of the motor-cars. Such parts are sometimes higher in price than the products of independent manufacturers specializing in certain lines of replacements.

The opening of Kwangsi Province in South China has given an impetus to the demand for replacement parts with which to rehabilitate motor-bus transportation services in that area.

Garage and Service Equipment

In North China, owing to slackness in the automotive business in general, there has been no extension of service facilities.

At Shanghai the opening of the Triangle Motors during May brought into being one of the most modernly equipped garage service stations in the city. All-American tools and equipment were installed.

There is a tendency on the part of oil filling stations to institute a "service feature," which has heretofore been woefully lacking in the Shanghai area. One American oil company, in opening a new filling station, has offered to render such service as oiling, greasing, and minor repairs.

A recent estimate of gasoline pumps in China (including Hong Kong) shows that, of 848 filling pumps, over 50 per cent are located in Shanghai, and it is estimated that 58 per cent of them are dispensing American gasoline. Pumps are found in 11 of the 28 Provinces of China.

Public Service of Phototelegraphy in Japan

(Continued from page 762).

commercial advertisements, cinema stars, etc. But on the occasion of the great earthquake in the Izu district on November 26, 1930, photograms of the pitiable state of the destroyed places, maps of the affected area, the wave forms recorded on the seismometer, etc., were transmitted. The cable circuit was interrupted by the earthquake and consequently the No. 1 Set, working on the open wire line, was operated during this time and over 90 phototelegrams were sent out without any undue delay. The authorities were, therefore, by this means advised almost instantaneously of the terrible conditions in the affected area and were able to arrange for the relief of the people suffering from the disaster.

The charge between Tokyo and Osaka is Y.5.00 for the size up to cabinet size (18 by 13 cm.) and Y.8.00 for the larger size. The amount of traffic is nowadays relatively small, except in the case of some notable event, but with popularization of phototelegraphy and technical simplification of equipment and operation, the future of phototelegraphy will be assured.

Railway Equipment Market in Manchuria

(Continued from page 739)

on the Peiping-Liaoning Railway late in June, and the shop is planning to build four more in the immediate future. This move indicates the influence of present exchange rates on consumers of all imported articles, and it is probable that further developments in local manufacture will take place if exchange remains at its present low level.

Railway Shops and their Equipment

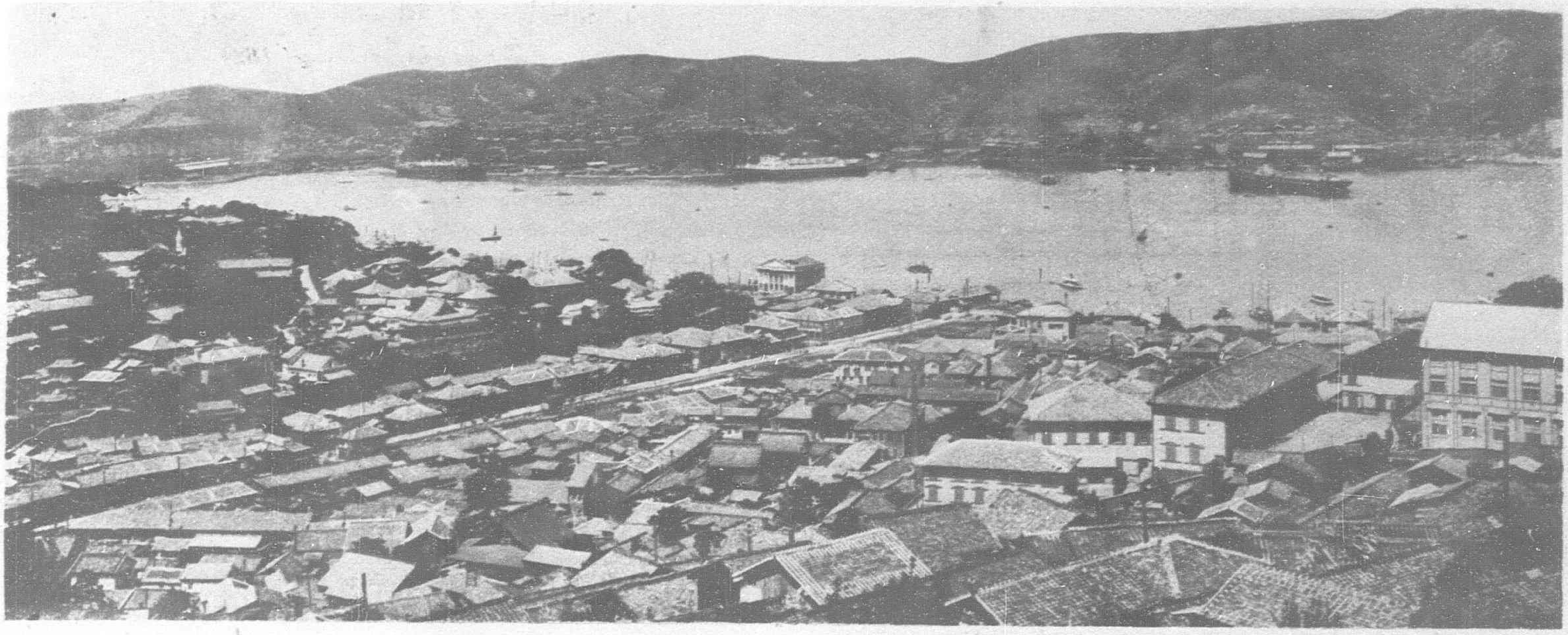
The Japanese-controlled South Manchuria Railway and the Sino-Soviet-controlled Chinese Eastern Railway each has adequate shop facilities for supplying equipment and making repairs for their own lines. The South Manchuria Railway Co. also has sufficient facilities for furnishing numerous locomotives and cars to the Chinese Government Railways. The shop facilities of the Chinese Government Railways, however, are rather inadequate. The Peiping-Liaoning Railway has two well-equipped shops, one located at Huangkutun (a suburb of Mukden) and one at Tongshan (south of the Great Wall); the Huangkutun shop is arranged for further expansion, and new tools have been purchased. In Mukden the Northeastern shop, which formerly belonged to the Northeastern University, is now used mainly for work from the various Chinese railways lacking shop facilities. Part of the Mukden Arsenal also has been turned over to repair of locomotives and railway cars and promises to expand further in this direction.

Most of the remaining Chinese railways lack adequate shop facilities. Individual tools have been purchased from time to time as funds have become available, but practically no complete shops have been erected. Some of the railways even lack car-wheel lathes and other essential tools and have to depend on the shops of other railways for this kind of work. There is undoubtedly a great need for further shop facilities for the bulk of Chinese Government Railways.

Outlook

While present economic conditions in Manchuria do not warrant very great expenditures for the best of equipment, there is undoubtedly still a good future market there for first class equipment. The railways are improving in operation and are demanding heavier rolling stock and higher speeds, all of which will eventually prove the necessity for the best equipment available, though present conditions have made it necessary in many cases to purchase the cheaper equipment instead of the higher priced approved by sound engineering. This condition may not prevail in the future, and it is quite possible that the market for high-grade American rolling stock and tools will improve.

The Northeastern Communications Committee supervises in a general way the purchase of equipment for all Chinese Government Railways, though minor purchases are requisitioned by the various engineering departments of each railway and are handled through their individual purchasing departments. Purchases of the South Manchuria Railway Co. are made through Dairen, and those of the Chinese Eastern Railway through Harbin. Both of these organizations usually call for sealed tenders, which are opened in public.



General View of the Nagasaki Shipyard and Engine Works

The Nagasaki Shipyard and Engine Works of the Mitsubishi Shipbuilding and Engineering Company, Limited, at Akunoura, Nagasaki

Giving a Brief Description of the Works and Particulars Regarding Products Manufactured

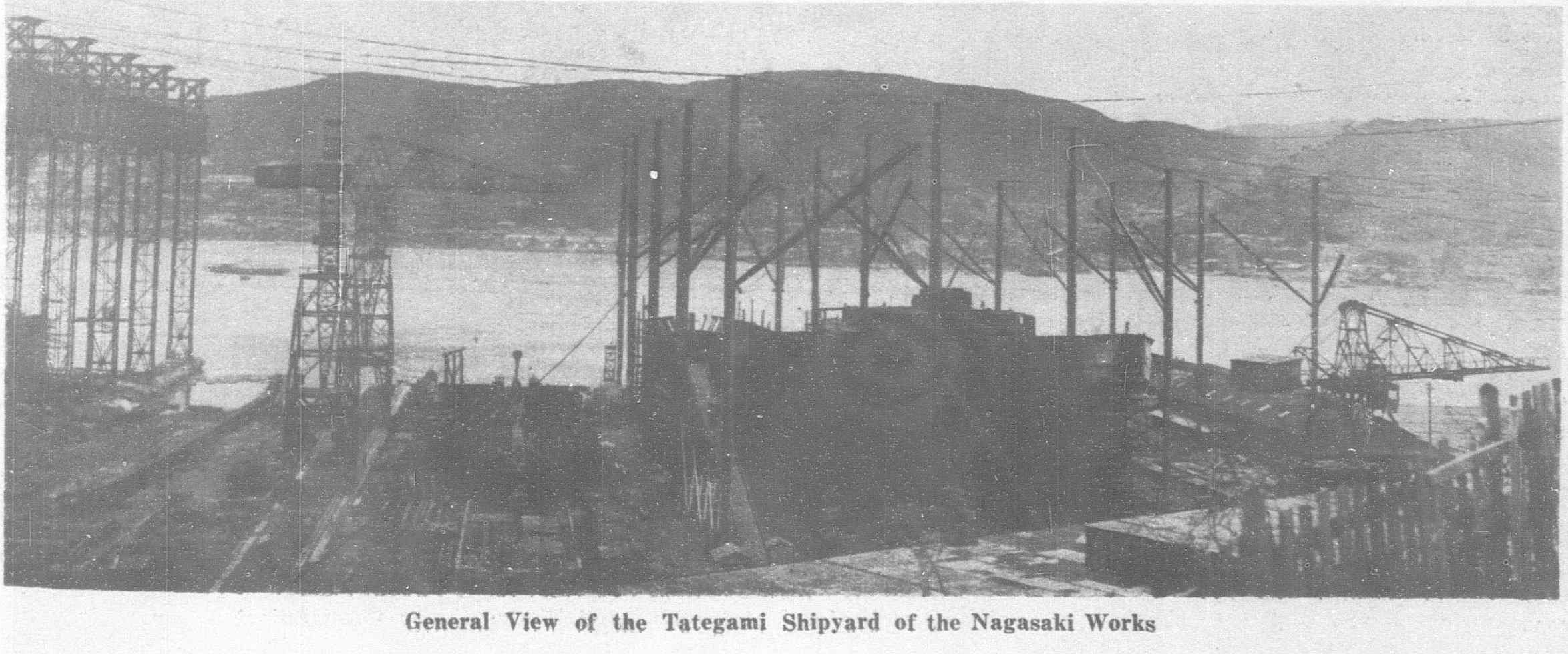
THE works occupy a land area of 156 acres, with a water frontage of about two miles in length along the western shore of Nagasaki, which is the chief south-western city of the Empire, and possesses one of the finest harbors in the world. The works consist of two main plants, namely, the *Tategami Shipyard* and the *Akunoura Engine Works*, with ancillary saw mills and an electric steel works.

The works engage in every branch of shipbuilding and engineering, and undertake the design, construction and repair of all classes of warships, steam and motor passenger liners, cargo vessels, oil tankers and any craft for special purposes: steam turbines, Diesel engines, steam reciprocating engines, boilers (for both marine and land purposes), pumps, auxiliary machinery, such as condensing, feed heating, evaporating and deareating plant, ship stabilizers, (Sperry's and Motora's systems), etc., etc. Besides the manufacture of heavy steel castings and forgings, etc.

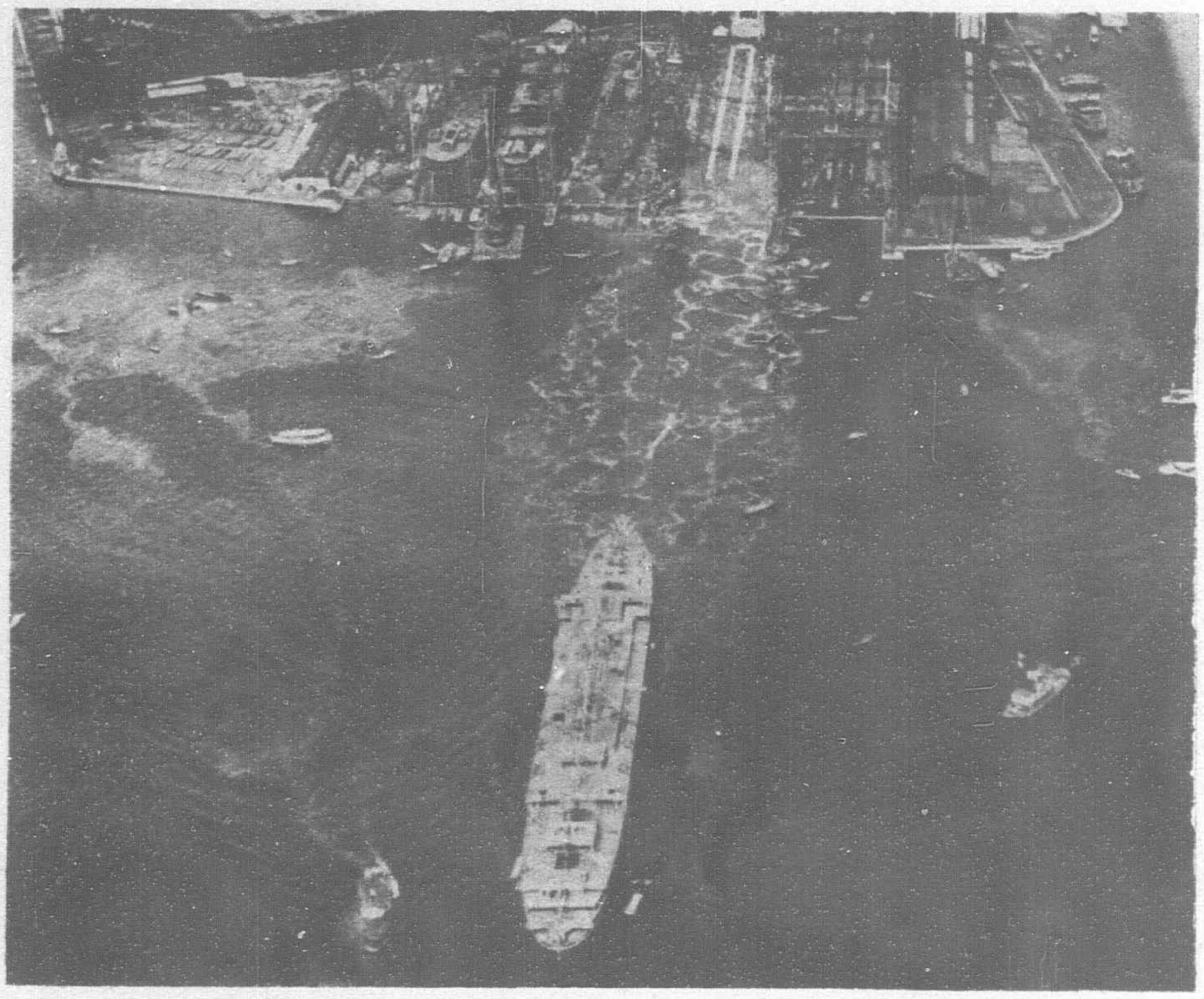
The shipyard has six concrete building berths. No. 1, which is the largest, is over 800 feet in length and 64 feet in width, and is equipped with a gantry 1,061 feet long and 116 feet wide.

Principal construction in the shipyard up to the end of August, 1929, was as follows :—

VESSELS —1,000 gross tons and under 5,000 gross tons	40
5,000 ,, ,, ,, 10,000 ,, ,,	61
10,000 ,, ,, over	11
Total vessels	112



General View of the Tategami Shipyard of the Nagasaki Works



Aerial View of the Tategami Shipyard of the Nagasaki Works

WARSHIPS :—Under 1,000 tons displacement	. .	13
1,000 tons and under 10,000 tons displacement	. .	20
20,000 tons and over	. .	3
Total war vessels	. .	36

There are three dry docks constructed of stone at this shipyard, the largest having a length on the keel blocks of 714 feet, and it is capable of taking vessels of over 20,000 gross tons.

The engine works, at Akunoura, laid out on the most up-to-date plan and possessing all the most modern equipment, has specialized for many years in Diesel engines as well as steam power plants for land purposes, in addition to marine installations.

A hammer-head crane, 178 feet high, with a span of 143 feet and a lifting capacity of 150 tons at 80 feet, and 50 tons at 143 feet, stands on the jetty.

Connection between the Akunoura Engine Works and the Tategami Shipyard is maintained by the aid of numerous locomotive-driven trains and freight cars for the conveyance of workmen and materials, and by high speed motor boats and barges and a 34 ton floating crane.

Mitsubishi Steam Turbines

The Nagasaki Shipyard and Engine Works of the Company first co-operated with the late Sir Charles Parsons of England, the inventor of the turbine which bears his name, in the year 1904, when it acquired from the Parsons Company a license for the reaction type of marine and land steam turbine, and also for turbo generators. In addition to the technical staff which proceeded to England to receive training in the design and manufacture of this steam turbine at the time the license was procured, constant touch was maintained with the licensors during the period in which the license was operating, and all improvements, inventions and new developments were available to the Japanese interests.

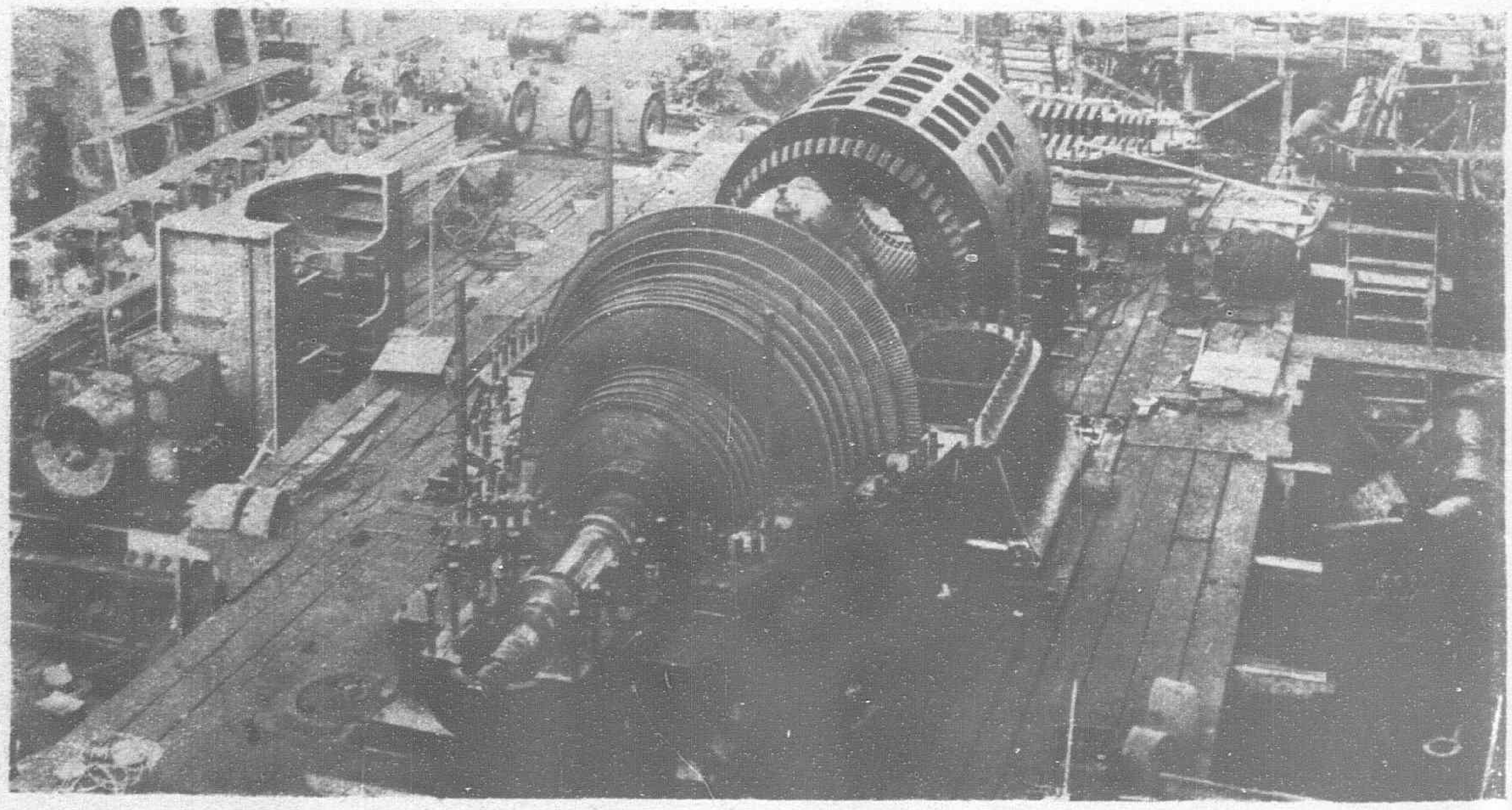
Twenty-five years have elapsed since that agreement was entered into, and by incorporating the results of experience, we designed and commenced manufacture about ten years ago of an impulse type of steam turbine. Investigations have been made continuously during all these years both from a theoretical and practical standpoint, which have resulted in improved construction and the choice of materials best suited for the manufacturing process.

Later, in 1925, we entered into a license agreement with Messrs. Escher Wyss and Co., the celebrated Swiss turbine makers, covering their impulse turbine for both land and marine application. Engineers and foremen have undertaken careful study at their works in Switzerland, and we are confident that the steam turbines produced at this works, whether of the pure impulse or reaction, or of the combined impulse-reaction—whichever may be required to suit the circumstances—will compare most favorably with the best turbine now produced anywhere.

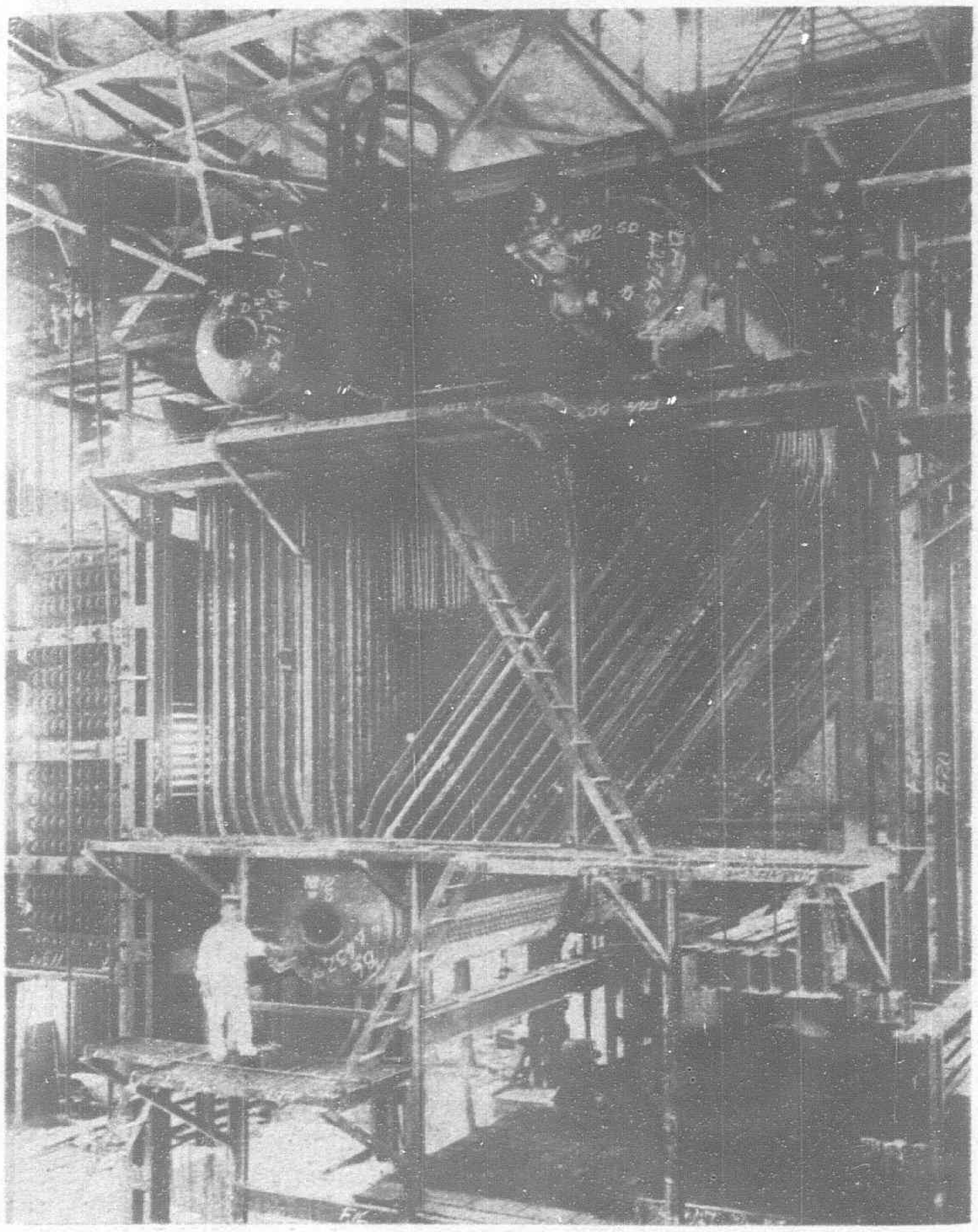
In the year 1918 we established a research laboratory in Tokyo. Among the various studies and investigations conducted here are those which relate to materials. These researches resulted in the invention of what is known as Iidaka metal as blading material for steam turbines and the Suyehiro and Kuno dynamical balancing machine, which has proved of great value in the balancing of turbine rotors. Other investigations resulted in our obtaining the combination between the profound theory and practice in the vibration of rotors and bearings.

Special " Pearlite " cast iron, capable of resisting very high temperatures, was introduced by the Nagasaki works themselves. By using this cast iron, fear due to faults in material is entirely eliminated. Stainless steel was adopted for turbine blades, and this has proved most satisfactory.

In connection with the subject of steam turbines, mention must be made of the important order completed last year for the Kawasaki power station of the Imperial Government Railway Department. This order marked an epoch in the manufacture of steam turbines at the works. The Kawasaki power station has a generating capacity of a normal output of 60,000 kw. and a momentary output of 120,000 kw. with three sets of turbine generators installed as main generating units ; of these, two sets are of our make. Both are of the double cylinder tandem compound Mitsubishi-Zoelly all impulse type, directly coupled to generators



25,000 kw. Mitsubishi Zoelly Steam Turbine Generator for the South Manchuria Railway Company, Manufactured at the Nagasaki Works, (under Construction)



Mitsubishi Vertical Tube Boiler for the Yamagata Denki Kabushiki Kaisha, Manufactured at the Nagasaki Works, (under Construction)

and exciters of Mitsubishi Electrical Engineering Company's make, and have Mitsubishi-contraflo condensing plant with feed heating and evaporating plant. Each turbine is designed for an economical output of 20,000 kw., 25,000 kw. for two hours continuous running and a momentary output of 40,000 kw. at a speed of 1.500 r.p.m. The main steam pressure is 25 Kg./cm.2., temperature 375 degrees, Centigrade, vacuum at turbine exhaust flange 722 m. Both of the turbines were delivered last year, and were put into service immediately. They have been in continuous service ever since, and are running with perfect safety and smoothness, and giving the utmost satisfaction.

One of these two turbines was subjected at the end of March last year to steam consumption trials in the presence of the officials of the Imperial Government Railways, and the most stringent tests to meet the contract requirements were fulfilled with eminently gratifying results, reflecting the greatest credit on the design and manufacture.

Recently a turbine using steam of a pressure of 38 atms. and a temperature of 427 degrees Centigrade, with an output of 12,500 kw. at the generator, was manufactured in the Nagasaki works. Official trials were most satisfactory. We have now under construction turbines using a steam pressure of 42 atms. and a temperature of 385 deg. C., with a maximum output of 38,500 kw. at the generator. Thus we have gradually advanced by stages to the production of the biggest units with high pressure and temperature.

The total output of turbines up to date is as follows :—

For Naval purposes.	111 sets.	Capacity	1,991,500 h.p.
,, Mercantile ,,	46 ,,	,,	189,500 h.p.
,, Land ,,	171 ,,	,,	392,815 kw.

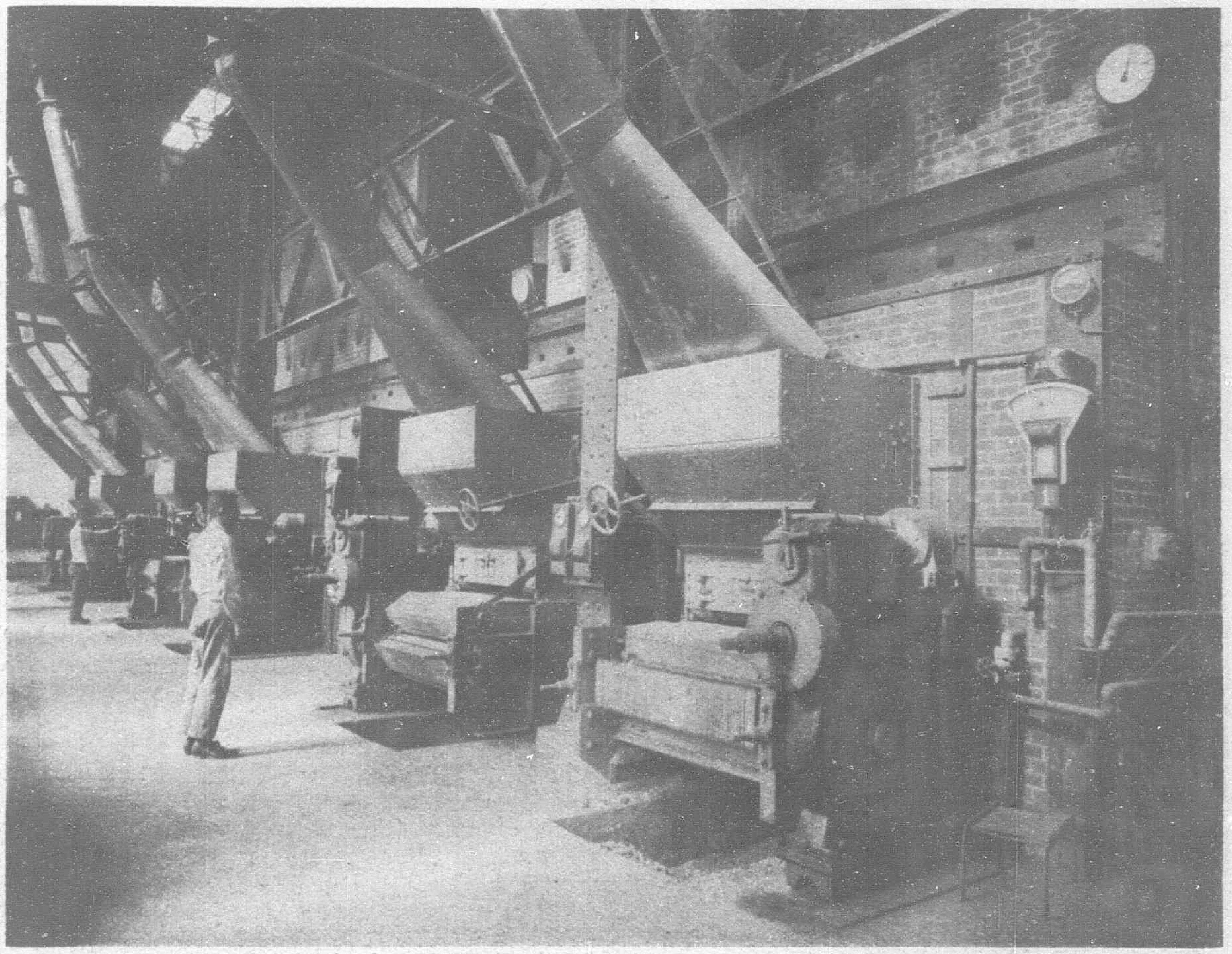
The Mitsubishi-Sulzer Diesel Engine

In the year 1924, a manufacturing license with the world-renowned Sulzer Company of Switzerland was taken up, and several engineers and foremen received training in the design and manufacture of these engines The license covers the well-known air injection 2-cycle type for marine application. Since manufacture was commenced by us, 35 sets of these engines have been constructed of a total h.p. of 115,000.

The main features of these engines are as follows :—

The engine is provided with two tiers of scavenging ports with control valves, so that scavenging is carried out completely. Supercharging is done with the utmost simplicity, permitting of a high heat efficiency so that complete combustion is possible even with the most inferior quality of fuel oil.

The cylinder cover has only one hole in the center, and all the valves in the cover, such as fuel valve, starting air valve and safety valve, are located there encased in one valve chest, so that the cylinder cover which receives the most high heat effect is of simple shape and of adequate strength, thus complete and uniform cooling is made possible.



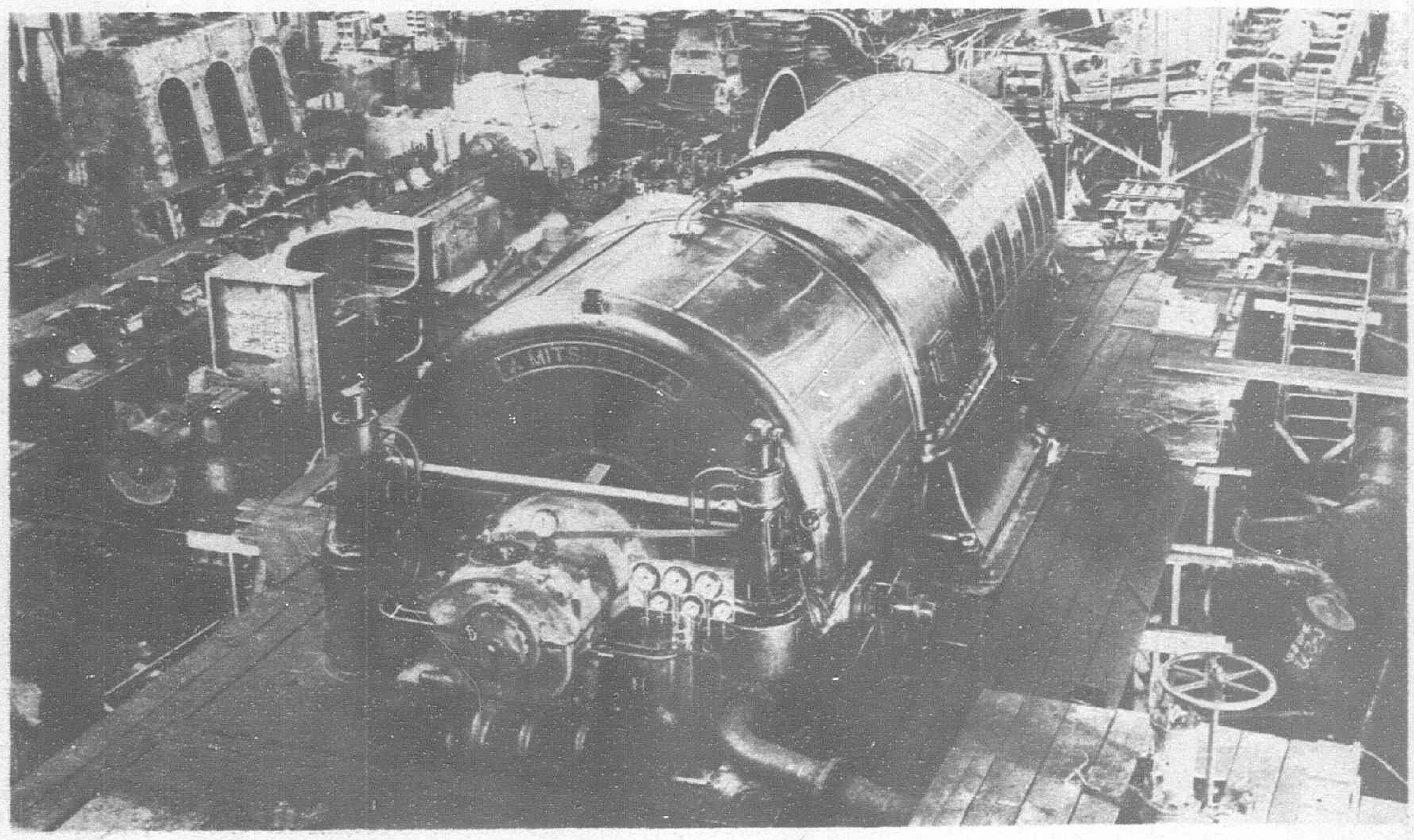
Mitsubishi Vertical Tube Boilers and Mitsubishi Mechanical Stokers at the Ogura Works of the Oji Seishi Kaisha, Ld., Manufactured at the Nagasaki Works

Piston cooling is of the jet type and most effective for steady cooling. Such troubles as the leaking of cooling water into the crank case are never met with.

The engine has direct reversible gearing and automatic starting gear, therefore manipulation is steady and simple. The reversing apparatus serves also to adjust the fuel valve lift.

A chamber in the engine, called the "lantern," is arranged between the cylinder and the crank case. It collects the soiled oil dripping from the cylinder and keeps the lubricating oil in the crank case purified. It also permits a distance of two-thirds of the whole length of the piston to be visible, and should any trouble occur it is possible to prevent it extending.

The columns form a powerful frame by themselves, and are most effective in preventing vibration of the hull.



25,000 kw. Mitsubishi Zoelly Steam Turbine Generator for the South Manchuria Railway Company, Manufactured at the Nagasaki Works

Mitsubishi-vertical Tube Type Boilers

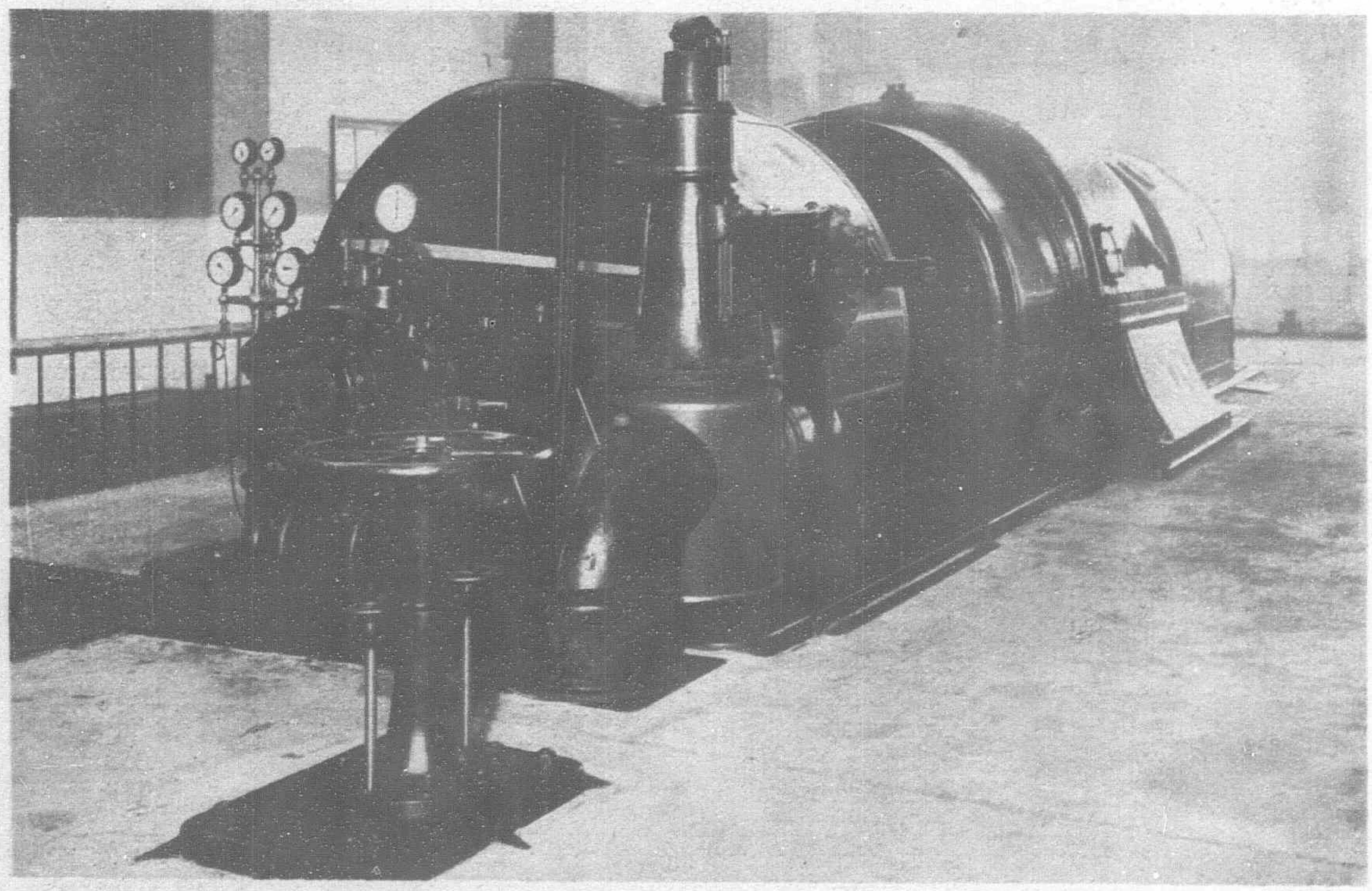
This boiler is based on the original Duerr-Garbe design, with the incorporation of many improvements. A manufacturing license was secured in the year 1925, when some engineers went to Germany to receive training in the design and manufacture of these boilers, and since then constant touch is maintained with Messrs. Duerr, and new developments and inventions are all available to us. We have also been able to take advantage of our own long experience in boiler manufacture, which we first commenced as far back as 1904, to incorporate the results in the Duerr type of boiler.

The total manufacture of this type of boiler by us amounts to over 30 sets, the heating surface of some of which is 1,350 sq meters with a steam pressure of 46 Kg. per sq. cm., and steam temperature of 400 degrees Centigrade. We have been eminently successful in this branch of our industry, and all the boilers have given excellent results, which has added to our reputation as boiler makers.

An important installation of boilers by us was made to the Kawasaki plant of the Imperial Government Railways. Each of the boilers has a heating surface of 1,300 sq. meters, a steam pressure of 29 Kgs. per sq. cm. and a temperature of 400°C. These boilers on test were subjected to the most stringent and exacting requirements in the presence of the officials of the Imperial Government Railways, satisfying the guaranteed efficiency of 82 per cent demanded by the clients, and fully assured the reliability of the design and manufacture, receiving the unstinted praise of engineers. Even when using coal with an ash content of 25 per cent the guaranteed efficiency mentioned is obtainable.

There are many special features embodied in this boiler, and a few of the main ones may be stated as follows :—

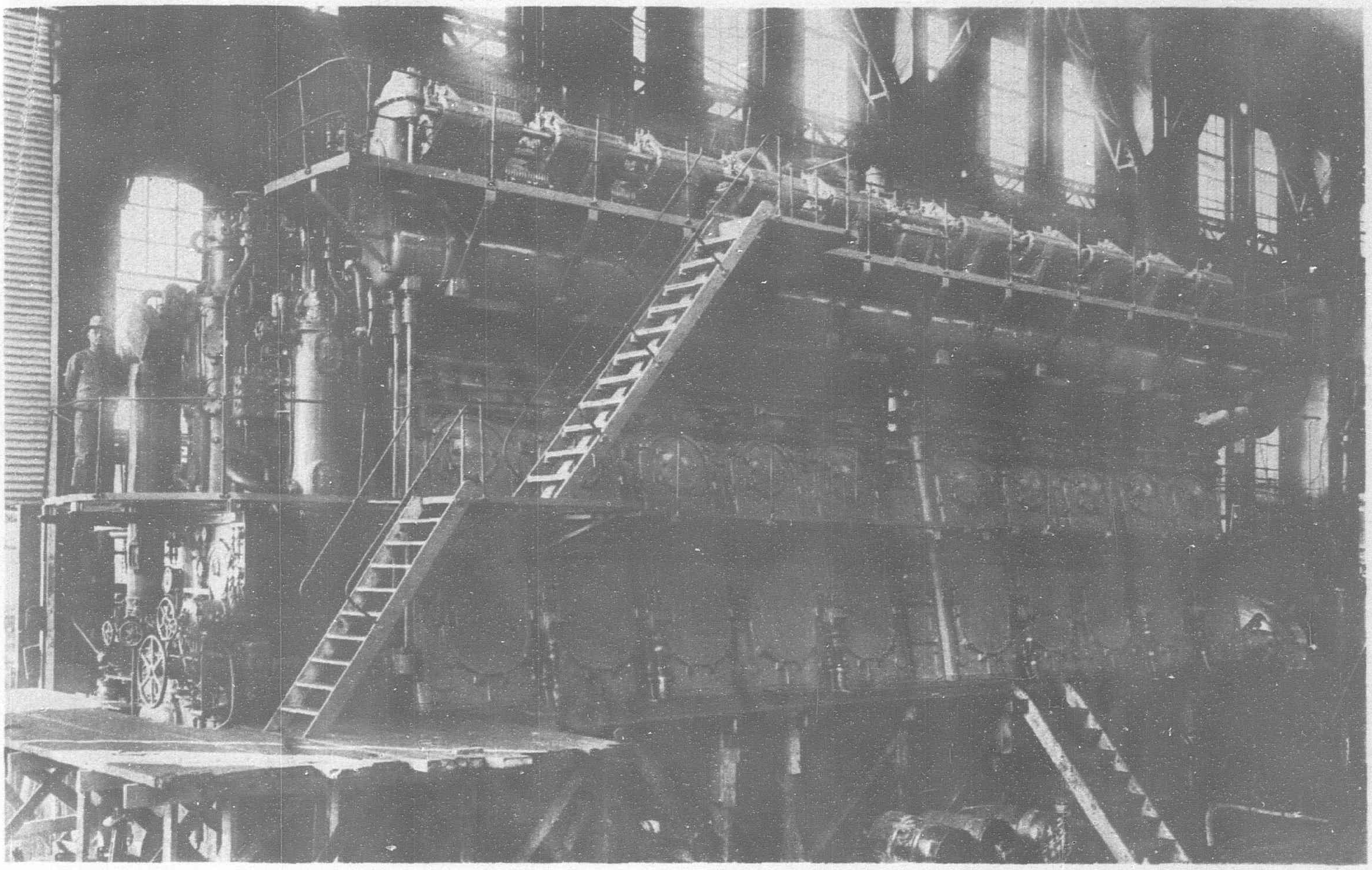
The water tubes are arranged in a vertical position or at an angle approaching the vertical. The openings of the water tubes to the upper drums are the full diameter of the tubes, and there are no obstructions. Circulation of the water is accordingly excellent, and because of the position of the tubes to the furnace very little scale is deposited inside the tubes, and furthermore, as the gas is made to pass parallel to the front row of the tubes, and not across them, soot cannot accumulate in the front row tubes, neither is there any ash deposit as is to be met with in the horizontal tube type of boiler. These are contributing factors to the high efficiency obtainable in our boilers.



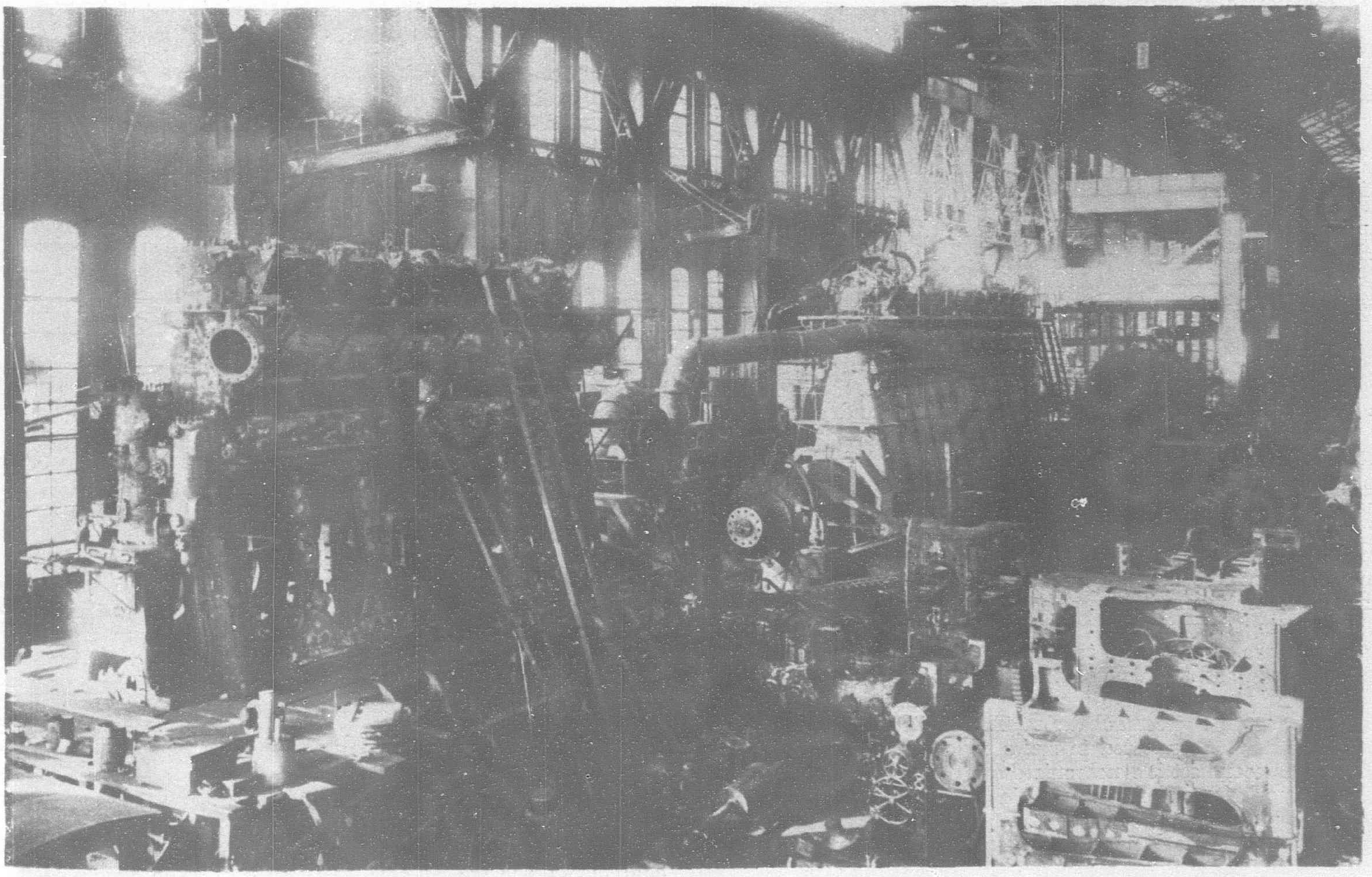
12,500 kw. Mitsubishi Zoelly Steam Turbine Generator for the South Manchuria Railway Company, Manufactured at the Nagasaki Works

Several types of boilers are manufactured by us. There is the single-bank straight tube type, single-bank curved tube, double-bank straight tube, the three drum-curved tube type and the twin three-drum types, each to suit special requirements and needs.

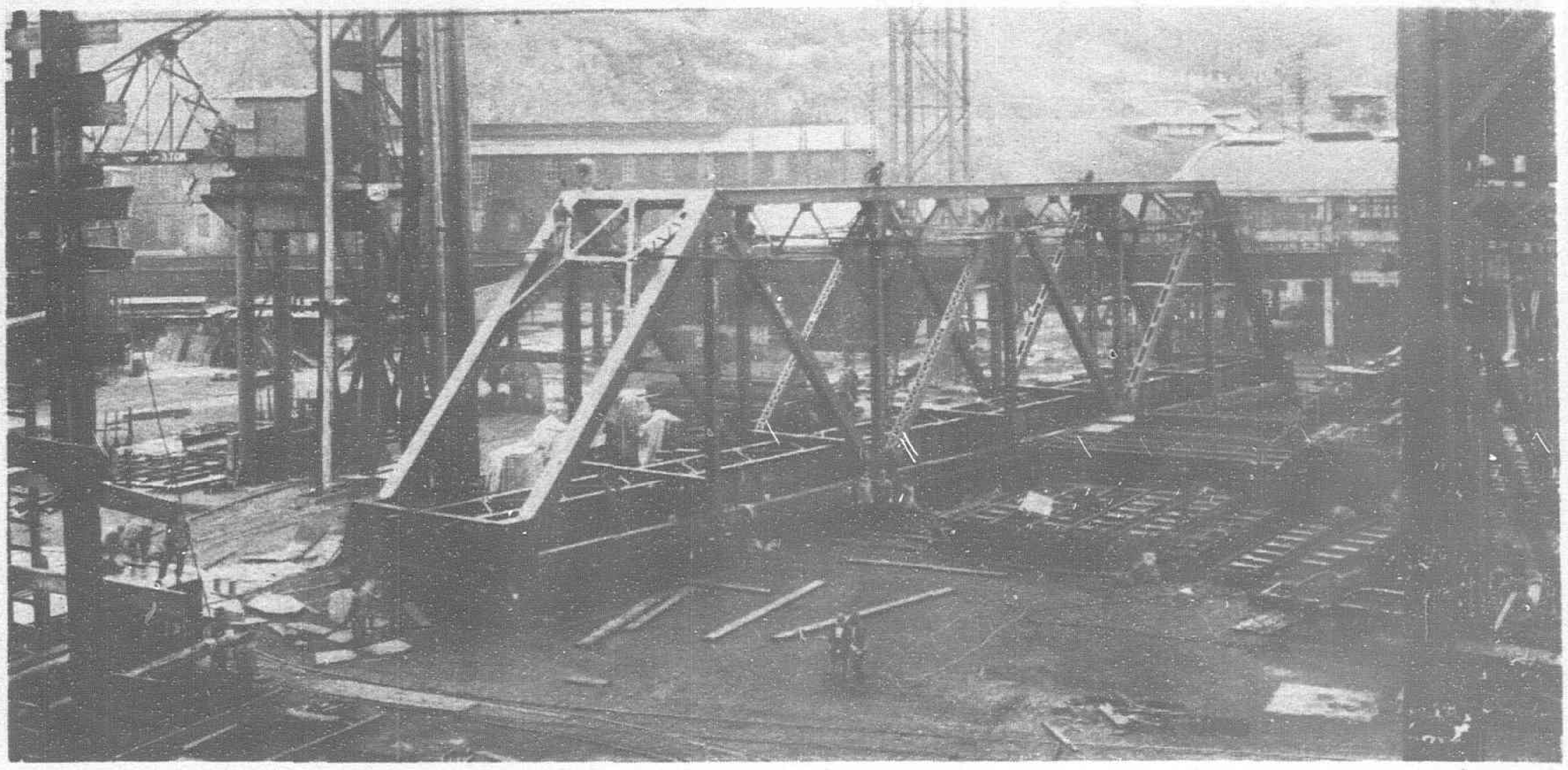
As regards the fuel burning system, either the travelling grate or pulverized coal systems are fitted according to the coal to be used and the load conditions. In the Mitsubishi travelling grate stoker the supply and distribution of air is perfect, and no undue stress is put on the grate bars. It is a very simple matter to replace



10 ST68 2 Cycle Single Acting Mitsubishi Sulzer Diesel Engine for the "Terukuni Maru" of N.Y.K., Manufactured at the Nagasaki Works



Interior View of the Fitter's Shop of the Nagasaki Works grate bars. The stoker possesses a special apparatus to prevent the dropping of ash through the grate bars, and the fire bridge is of unique construction, which combines to effect entire combustion of the fuel. The ribbed type special cast iron or solid drawn steel tube economizer, as well as superheaters of special construction, are also supplied to complete the installation. In some cases air preheaters are also provided, and these all go to make our boilers more efficient and to enhance the popularity of Mitsubishi power plants.



Warren Truss Girders in 14 Spans for the Chinese Government Railways, Manufactured at the Nagasaki Works

Bridge Girders, Frame Structures, Welded Pipes and Tanks

In the manufacture of these materials, the utmost attention is devoted to the selection of material, and by the most up-to-date outfits and equipment, combined with high-skilled and able workmanship, backed by long years of experience, the products in this line of work enjoy a very high reputation for quality and reliability.

Recently an order for 2,140 tons of Warren truss girders, in 14 spans, has been executed by the works for the Chinese Government Railways, marking an advance in overseas activities in this special line of business.

Art Metal Furniture

The manufacture of art metal furniture is one of the specialities of the works. It comprises tables, desks, chairs, filing cabinets, wardrobes, show cases, shelves, etc., etc., as well as architectual parts such as doors, partitions and window frames.

Art metal is a high class thin steel plate of special composition. It is non-inflammable and thus fire-proof, and is easy to treat. Accordingly, it has a wide application. It is very strong and durable, and is not affected by extreme temperatures, does not warp and is proof against rodents. In addition to its great strength and durability, it has a beautiful enamel finish. By means of a patented process of our own, various wood grain colors to suit distinctive tastes can be vividly produced which give an elegant appearance. Special note should be taken of the great fire preventing qualities of art metal. Of late years the demand has greatly increased and it enjoys a very high reputation.

Steel Castings and Forgings

The works has its own electric steel plant equipped with two 9-ton electric basic steel furnaces, each of which is capable of dealing with :—

Castings of a maximum weight of 12 tons, and
Forgings ,, ,, ,, ,, ,, 18 tons,

as well as a 1,500 ton hydraulic press. This plant has an annual capacity of 6,000 tons, the products of which are :—

CASTINGS.

Turbine cylinders,
Water turbine runners,
Cylinders, cylinder heads, beds, etc. for high speed Diesel engines,
Electric motor yokes, etc.
Various gear wheel blanks,
Stern frames, rudder arms, shaft brackets,
High pressure steam fittings.

FORGINGS.

Turbine discs,
Rotor shafts for generators and turbines,
Crankshafts for Diesel and steam recip. engines,
Intermediate shafts,
Propeller shafts,
Crosshead pins,
Connecting rods,
Piston rods,
Couplings.

Substation Practice in Japan

(Continued from page 751)

a definite time-interval, which is fixed beforehand according to requirements. After a predetermined number of unsuccessful attempts to close have been made, the affected feeder breaker is locked out and the lock-out device must be set by hand when normal conditions are restored. The second set would only start-up on the occurrence of overload of sufficient duration or magnitude, or in the event of some trouble developing on the first set. It may, of course, be started-up for inspection at any time by operating a push-button switch on the control desk.

Shutting down is effected by the master time-switch, or, if both sets are running, the second set to start-up may shut down on underload and the time switch will shut down the set that was the first to start-up. The sequence of starting is predetermined by switches on the control desk. The exciters and field circuits of both sets are connected in series when both sets are running. When the second set is synchronized and in the full " run " position of the camshaft controllers, the field circuits of this set are automatically put in series with the field circuits of the first set, thus ensuring that the cold machines share the load equally with the running machines.

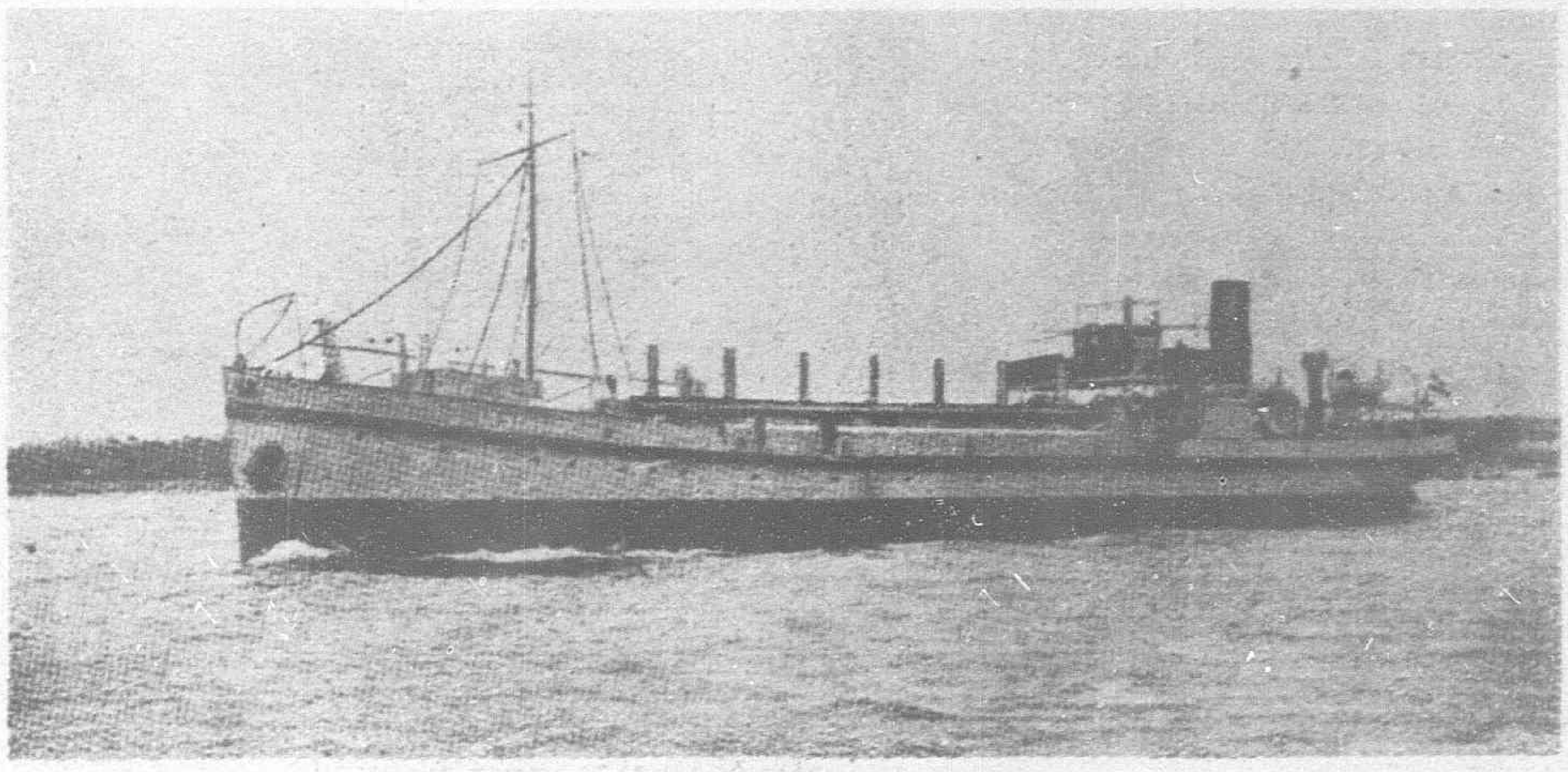
The machines are fully protected against the following faults : Incomplete or too slow start or failure to start ; a.c. leakage ; overspeed ; hot bearings ; field failures ; wrong polarity ; failure to synchronize ; a.c. overload ; single-phase starting ; and d.c. leakage. If any of these troubles occur the set concerned is locked out and the protective devices must be re-set by hand when normal conditions are restored. Protection is also afforded for a.c. low voltage or failure, and d.c. reverse current. In either of these cases the set is shut down, but can start again with normal conditions prevailing. Should a machine become overheated, the machine thermostat is operated, and causes the second set to start up if only one set is running. Should there be two sets running or should one set continue to overheat, this relay opens the d.c. machine high-speed breaker and contactor, which re-closes again on the machines of the set concerned cooling down sufficiently. In the event of phase reversal occurring, the set is locked out and the relay must be re-set by hand after the fault has been rectified.

Owing to the high ambient temperature—90 to 96 degrees, Fah—experienced in a Japanese summer, ventilation of the substations has been carefully studied. In the Heta station illustrated herein, this is provided for by screened apertures of adequate area near floor-level, and by roof ventilators. The bottom ventilating openings are equipped with adjustable louvres, as winter conditions are moderately severe. In addition to these substation equipments, the Ise Electric Railway has also in service locomotives and motor-coach stock equipped on the " English Electric" camshaft control system.

The Diesel-electric Suction Dredger "La Sangsue"

For the Harbor Boulogne-sur-Mer

By Dr. H. FISCHER, Lubeck



Suction Dredger "La Sangsue"

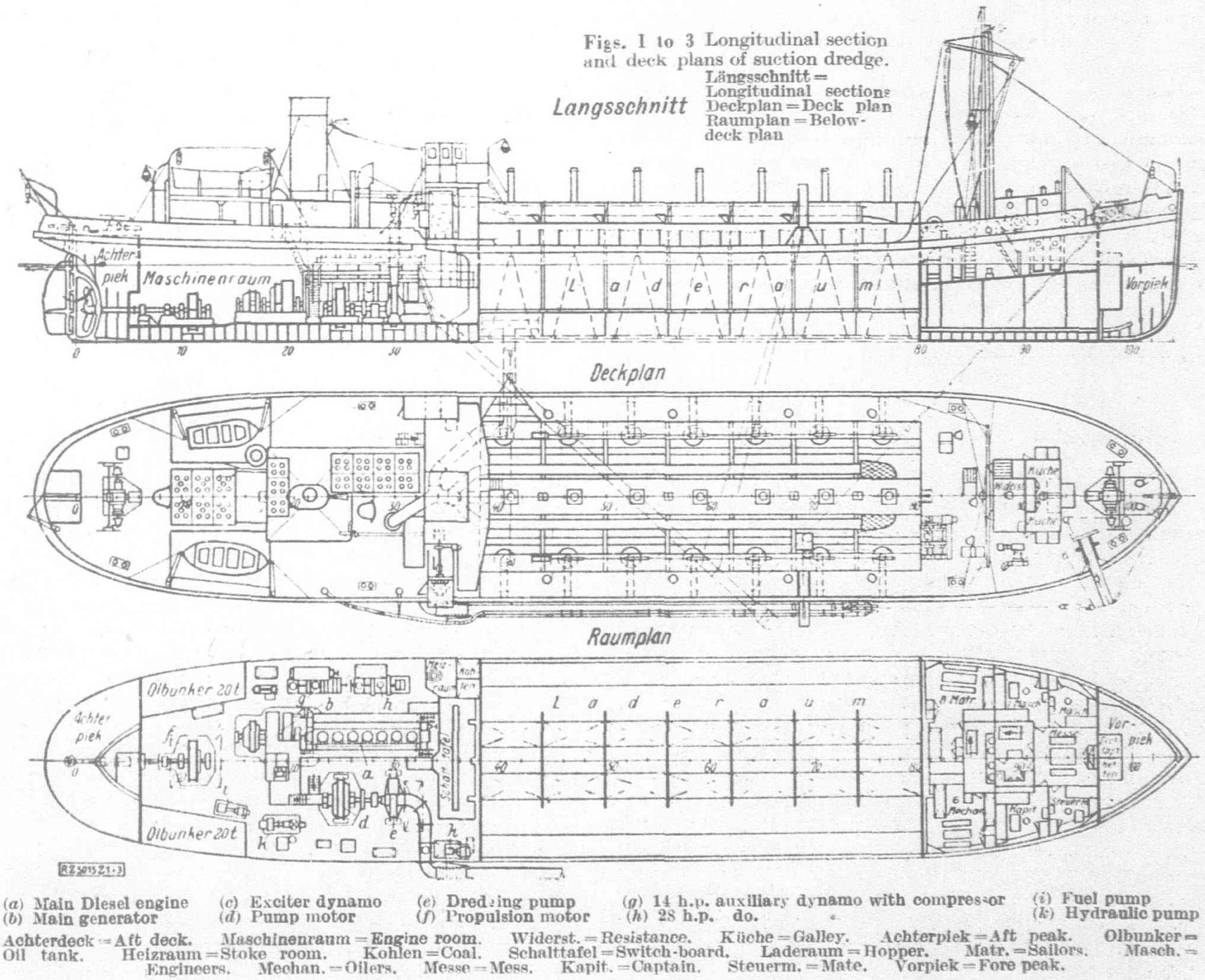
FOLLOWING is given the account of a German-built suction dredger which has now been in successful operation for two years. Both the propulsion and dredge drives are actuated by a single Diesel-electric plant, the main generator feeding in Leonard connection either the pump motor or the propeller motor, each of 700 h.p. capacity. The Diesel-electric plant, the arrangement and equipment of the vessel and dredging plant are described in detail.

The Lübecker Maschinenbau-Gesselschaft, delivered to the harbor administration at Boulogne-sur-Mer, a suction dredger with hopper and lateral suction pipe, in which the propeller, dredge pump, and all auxiliary machinery are driven by one Diesel-electric plant. The vessel, the arrangement and equipment of which are seen from Figs. 1 to 3, has the following principal dimensions :

Length between perpendiculars	..	62.6 m (207-ft.)
Overall length	.. .. ..	65.0 m (213-ft.)
Breadth, moulded	.. .. ..	11.3 m (37.2-ft.)
Depth, moulded	.. .. ..	5.36 m (17.6-ft.)
Maximum draught	.. .. ..	4.3 m (14.2-ft.)

Figs. 1 to 3, longitudinal section and deck plans of suction dredge.

The main Diesel dynamo is coupled as required either with the propeller motor or the suction pump motor. For this reason and because of the arrangement of the suction pipe, the dredger is not able to travel and work at the same time. Generator and motor form a Ward-Leonard set, the voltage and polarity of the direct-current generator being varied as desired by means of separate excitation. The armatures of the generator and of the motor, which latter also has separate excitation, are connected in series. Reversal of the polarity of the generator changes the direction of rotation, while an increase or decrease in the generator voltage changes the speed of the motor. For separate excitation of the generator and motor fields, an ancillary dynamo is provided, which is coupled to the main generator shaft



Figs. 1 to 3 Longitudinal section and deck plans of suction dredge.
Längsschnitt = Longitudinal sections
Deckplan = Deck plan
Raumplan = Below-deck plan

(*a*) Main Diesel engine (*b*) Main generator (*c*) Exciter dynamo (*d*) Pump motor (*e*) Dredging pump (*f*) Propulsion motor (*g*) 14 h.p. auxiliary dynamo with compressor (*h*) 28 h.p. do. (*i*) Fuel pump (*k*) Hydraulic pump

Achterdeck = Aft deck. Maschinenraum = Engine room. Widerst. = Resistance. Küche = Galley. Achterpiek = Aft peak. Olbunker = Oil tank. Heizraum = Stoke room. Kohlen = Coal. Schalttafel = Switch-board. Laderaum = Hopper. Matr. = Sailors. Masch. = Engineers. Mechan. = Oilers. Messe = Mess. Kapit. = Captain. Steuerm. = Mate. Vorpiek = Fore peak.

and furnishes direct current of 220-v. The switches and step resistances for the exciter current are therefore relatively small and easily to be attended, and the regulator can be operated from the engine room as well as by mechanical transmission from the bridge and the dredge master's stand. The propulsion of the vessel as well as the dredging operation can thus be controlled from several points. Any desired variation in load can immediately be effected from the bridge or the dredge master's station without having to be relayed through the engineer, thereby leaving to the latter the task of watching the running of the Diesel engine.

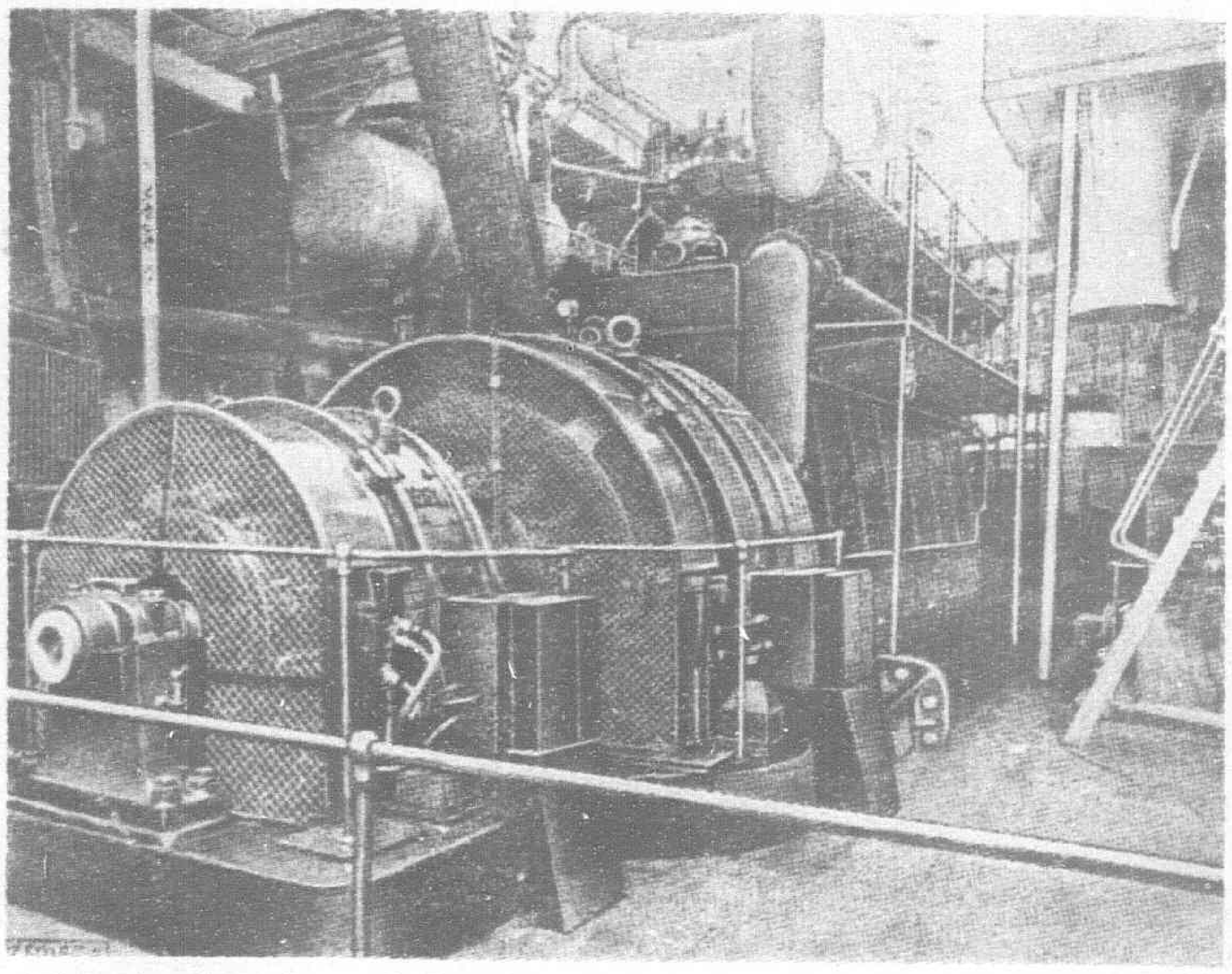


Fig. 4.—Interior of Engine Room, in foreground the Direct Current Generator with Exciter. In rear the Diesel Engine

Various indicating and checking devices are provided to insure the safety of the plant and give a constant check on operation. Each control stand is equipped with an ammeter and voltmeter for the main generator. The load at any given moment can therefore be instantly read, and if desired can be varied by means of a hand wheel provided on each stand and connected with the controller. In an emergency, the generator can instantly be brought to zero voltage by pressure on a push button, without the need of setting the controller mechanically to zero. Signal lamps show whether the pump motor or propeller motor are connected to the main generator. In the event of excessive load, one overload relay cuts out the excitation of the generator and thereby stops the motor. An additional safeguard against such overloads, which may be caused by odd pieces in the screw or pump, is provided in form of a slip coupling between the motor and pump.

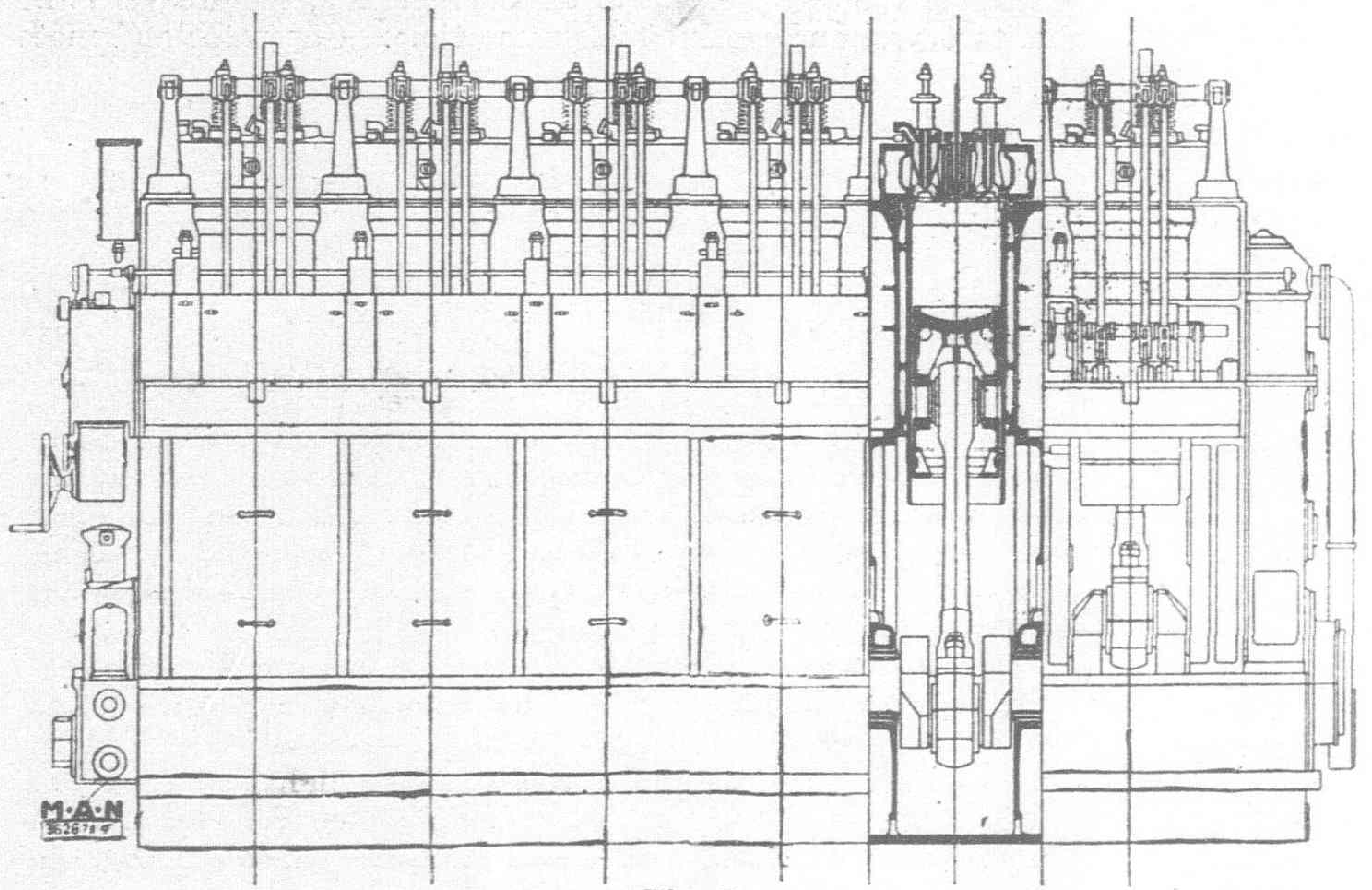


Fig. 5

The main Diesel set is seen in Fig. 4. It consists of a seven-cylinders M A N Diesel engine with an output of 850 h.p. at 250 r.p.m., a directly connected direct-current generator having a capacity of 600 kw. at+460/0/—460-v. on the same base with the engine, and a 175-kw., 220-v. auxiliary dynamo. In addition to delivering current for exciting the main generator and motors, the auxiliary dynamo also furnishes power for all winch and auxiliary pump motors.

The two direct-current motors for driving the ship propeller and the dredge pump have a capacity of 700 h.p. each at 210 r.p.m. Ten pumps, six winches, and the rudder engine are also driven by electricity. In addition, two auxiliary Diesel dynamos are provided, with compressors attached for starting air. These latter Diesel engines have an output of 28 and 14 h.p. respectively at 475 r.p.m., the output of the generators being 16 and 8.3 kw. at 220-v., or 7.2 and 3.8 kw. at 110-v. The auxiliary compressors each have a capacity of 24 m³ (850 cu. ft.) per hour at an ultimate pressure of 30 atmos. (425 lb. per sq. in.).

The electrical equipment has been supplied and installed by the Siemens Schuckertwerke A.G., Hanseatische Zweigniederlassung, Hamburg. The main Diesel engine, with an output of 875 h.p. at 250 r.p.m. as mentioned, has been built by the Augsburg Works of the Maschinenfabrik Augsburg-Nürnburg A.G. The two small auxiliary engines are products of the Motorenwerke Mannheim A.G., of Mannheim. Figs. 5, 6 and 7 show sections through a marine Diesel engine of somewhat lower output though of a design very nearly corresponding to the engine installed in the vessel. The pressure generated by the explosions is absorbed as usual by steel tension rods passing from the upper face of the cylinder block to the base, thereby completely relieving the cast iron cylinder block and the base walls of tensile stresses. This construction insures a high degree of safety, and provides the rigidity essentially required for marine engines. Because of the relief of the cast iron parts from all stress, the feet between the cylinders can be made very narrow, thus leaving large openings between the bearings in the base and giving convenient access to the crank case.

Good accessibility of all other parts, particularly of the fuel pumps, the governor drive, valves, and the like, has received very careful attention. Fuel is injected through open cooled nozzles of most simple design and not subjected to wear. The cooling of the nozzles renders coking impossible even when burning low-grade fuel, and prevents the accumulation of air in the fuel pipe. Any air contained in, and separating

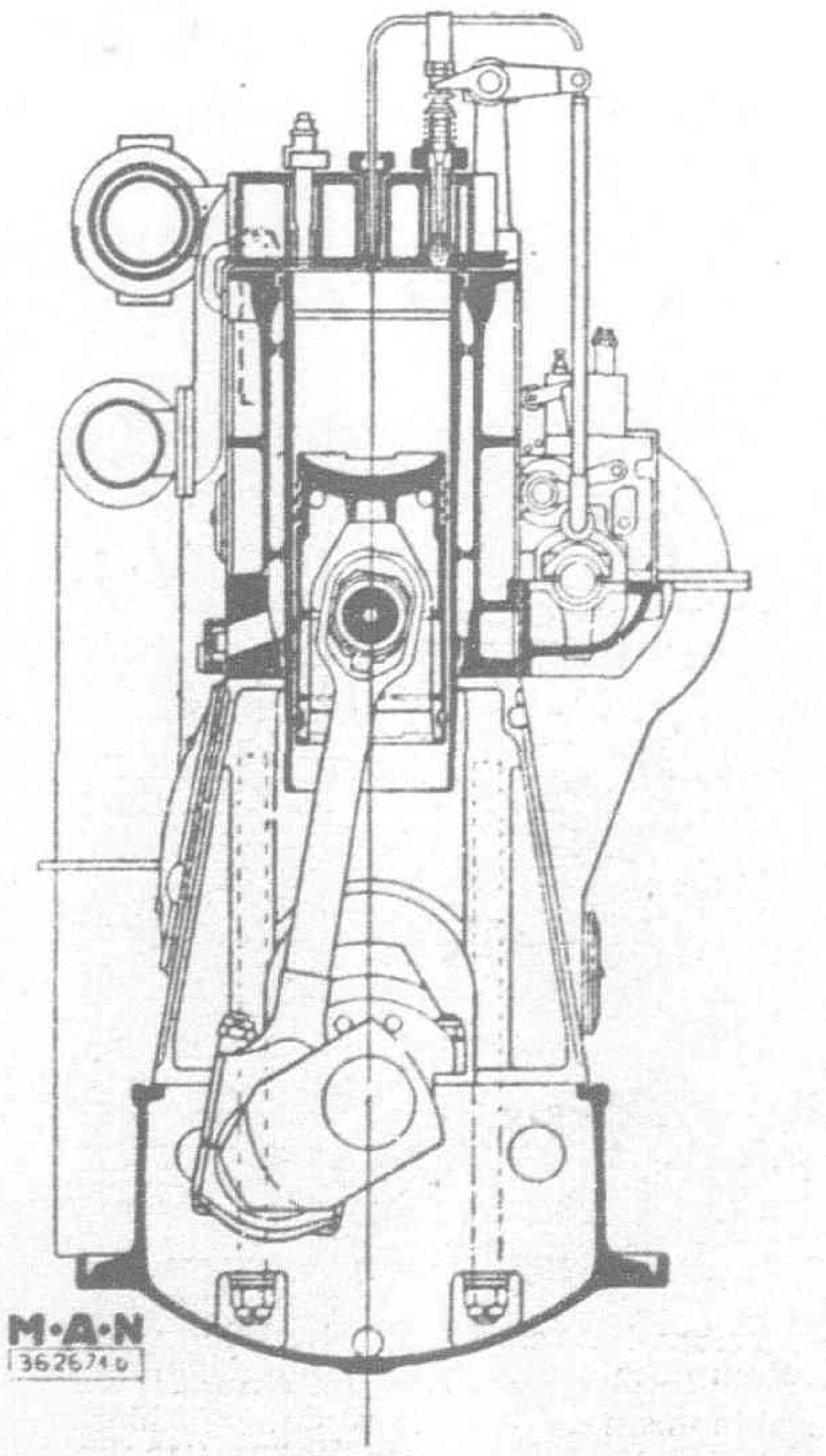


Fig. 6

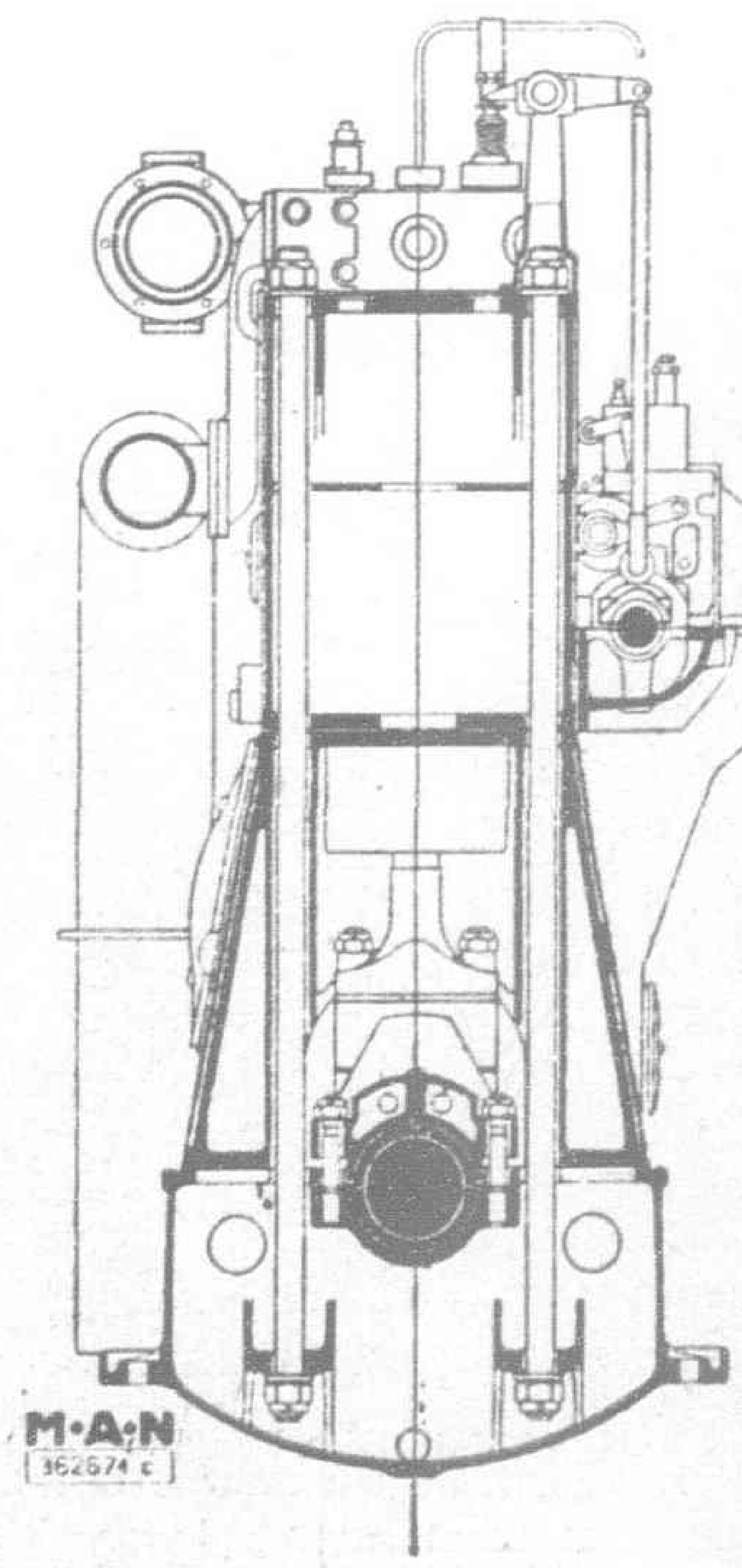


Fig. 7

from, the fuel is forced through the injection line. The peculiar action of the needleless nozzle, which gives as result a more gradual rise in pressure in the injection line and thereby prevents sharp and explosion-like combustion, is particularly advantageous in a marine drive. The direct injection without ante-chamber permits the cold engine to be started at a moment's notice and without preparation. Pressure lubrication of all important parts is maintained *via* a filter by a gear-pump directly driven by each engine, and safe operation thereby insured with a minimum of attendance.

Equipment of Vessel

The hull as well as the entire Diesel-electric and dredge plant correspond to the class + I-3/3 D 1. 1 prescriptions of the Bureau Veritas.

Thorough seaworthiness was a point kept in view in the design of the vessel. It has a continuous main deck, straight stem and stern posts, tug-type stern, and four main transversal bulkheads, as can be seen from Figs. 1 to 3. Located between the middle bulkheads is the hopper, of a capacity of about 800 m^3 (1,050 cu. yd.) of dredgings and 200 m^3 (260 cu. yd.) of surplus water. The lateral walls of the hopper are inclined towards the bottom, also the box-type central girder running lengthwise through the hopper amidships.

The floor of the hopper is formed by two rows of fourteen all-steel doors of very rugged design. These doors are actuated in pairs by seven hydraulic cylinders arranged on a rugged longitudinal bridge running amidships lengthwise of the hopper. In addition, special small hydraulic pumps are provided for regulation of the seven cylinders. Chain hangers with wedges, placed between the hydraulic cylinders, piston rods, and bottom doors, serve for holding the doors while the hopper is being filled. The bridge rests upon six cross beams. The partitions of the hull to either side of the hold are each sub-divided by three bulkheads and serve as spare service rooms.

The entire machine equipment is placed in the aft part of the vessel, where also are located the built-in fuel tanks, with a capacity of about 40 tons of oil, and a small room for the hot-water heating installation.

The foundations of the engines and pumps are of unusually strong design, and are so built into the remaining structure as to eliminate vibration entirely. The high strains arising during rapid unloading have been taken care of by the provision of large frame girders lengthwise of the ship and connected to the two terminal bulkheads of the hold, and further by strongly reinforcing the deck corners of the hopper.

The quarters for the crew are arranged in the forecastle. They consist of a cabin each for the captain, mate and first and second engineer, a mess-room and pantry for the officers, and a room each for eight sailors and six oilers, with a common anteroom serving as a lavatory.

The furniture in the officers' cabins is of polished mahogany, while the rooms for the crew are equipped with galvanized-iron bunks and deal furniture. All walls and ceilings are of wood, and are painted white and varnished. The wooden coverings are divided into panels arranged to be readily removable.

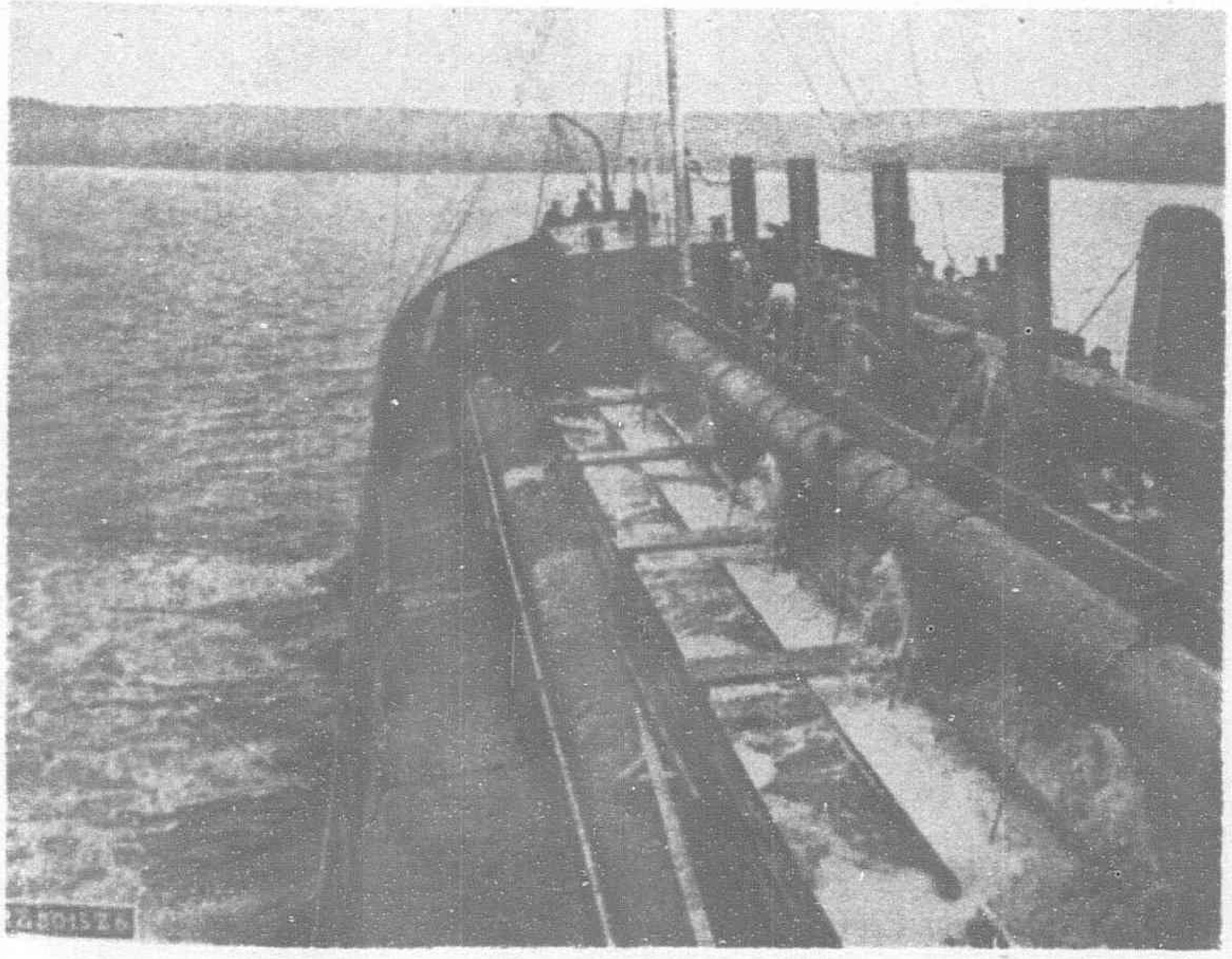


Fig. 9.—Dredger in operation

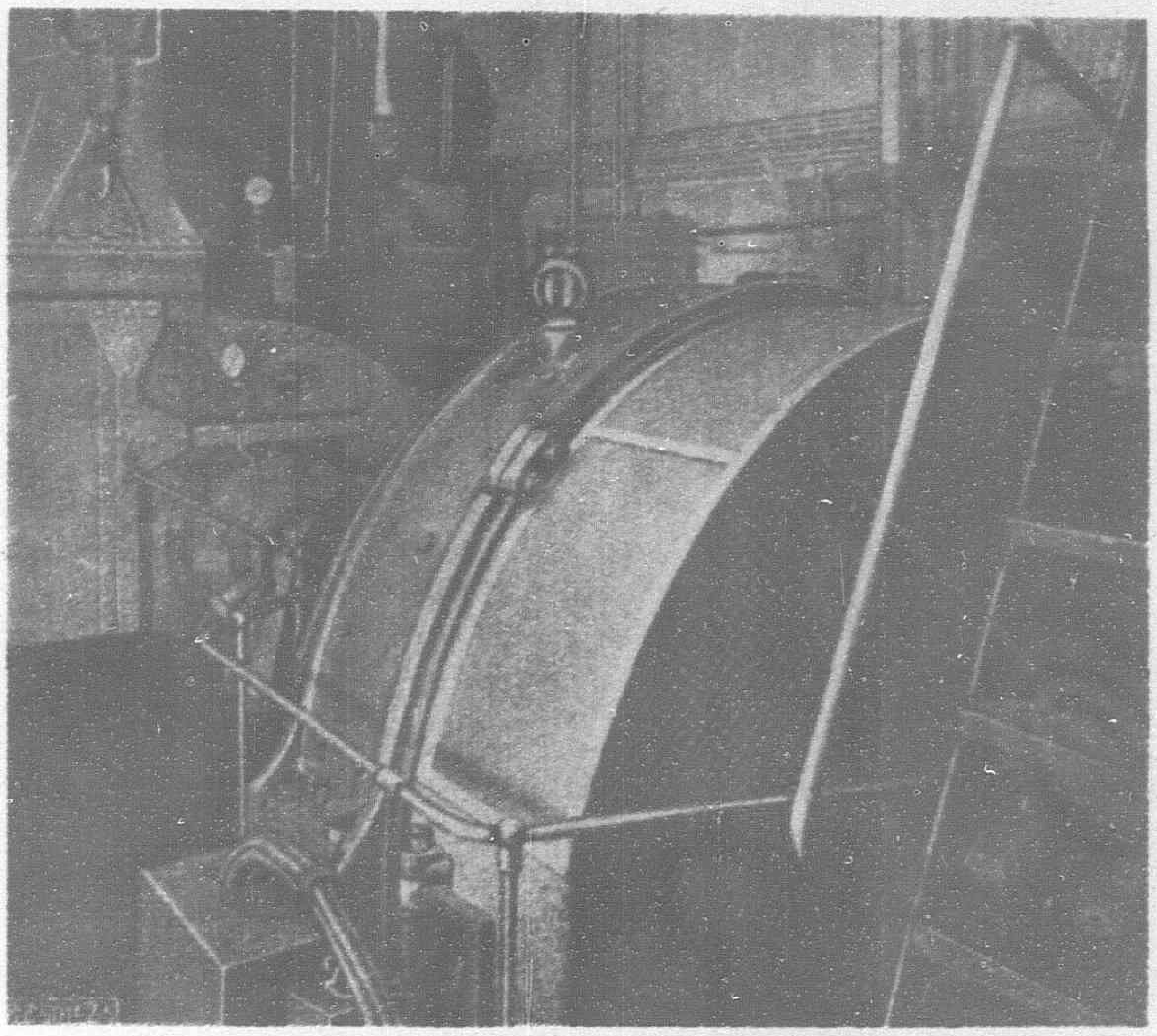


Fig. 8.—Pump Motor and Dredge Pump

A small steel deck-house on the forecastle gives access to the officers' quarters and contains a room for the resistances of the anchor and suction-tube hoists, located on the forecastle, in addition to a galley of usual type each for the officers and men.

The aft deck carries a navigation bridge which is supported on an angle-iron frame and surrounded by a teakwood bulwark, and carries a teakwood wheel-house with steering stand, compass, chart table, engine starting control, and other equipment. A second starting control is arranged on the dredge master's stand adjoining the hopper on the starboard side.

Lateral deck houses below the bridge contain the lavatories for the officers and the crew, a lamp room, and a passage to the donkeyroom. Above the engine room is a spacious steel structure with round side windows and a large steel sky-light, in the aft part of which the electrically driven rudder engine is located. The deck fore and aft is fitted with a solid bulwark, which is replaced at the central portion of the deck by a removable railing of wrought-iron posts and chains.

An adquate number of cleats and bitts are distributed over the deck, as well as hawses in the bulwark and roller cleats on the railing. The entire hull is protected at deck level by a heavy sheer rail of elmwood. The fore deck carries a wooden mast with a yard for signalling purposes.

The Dredging Plant

The dredging equipment comprises a suction pump of special design, shown in Fig. 8. with an open-hearth housing covered all over inside by an armoring of special steel. The suction pipe is located to starboard of the vessel. In view of the varying soil conditions met with in the area to be worked, the dredge is equipped with several special suction heads, including some with provision for the use of water under pressure for work in extra hard soils. The dredgings are sucked into the hopper through the pump delivery line seen in Fig. 9. In order to obtain a low entrance speed of the mixture into the hopper, special devices have been installed by which the fine-grained portion of the soil is caused to settle rapidly and effectively. In addition to this, means have been provided for slowly draining off the excess water brought in with the dredgings.

With an inclination of 40 deg. to the vertical, the suction pipe is able to work to a maximum depth of 19.5 m. (65-ft.). The pipe consists of a steel tube 650 mm. (21-ft. 1-in.) in diameter and reinforced by strong longitudinal structural-steel members. To the lower end of this pipe one of the different suction heads is fixed. The

(Continued on page 780)

Electric Machinery Installation on s.s. "President Coolidge"

*By H. C. COLEMAN**

The steamship *President Coolidge* is exactly the same as the steamship *President Hoover* in regard to tonnage, dimensions, and cargo and passenger carrying capacity. The only difference of any consequence between the two vessels is in the machinery installation. The new Dollar liner is driven by Westinghouse turbine electric machinery, and the electric auxiliary generating sets and motors for auxiliary power applications were also furnished by Westinghouse.

The propulsion plant consists of: two 13,250 horse-power synchronous motors, each coupled directly to one of the twin propeller shafts; two 15,000 horse-power steam turbines, each direct-connected to one of the two alternating current generators; and a control unit for these machines. Auxiliary power is supplied by four 500-kilowatt, direct-current, geared turbine generator sets. This machinery is all located in one engine room amidship. This engine room has two levels. The propelling motors, main and auxiliary condensers with their pumps and other auxiliary pumps are located on the lower level; the main and auxiliary turbine generator sets and the propulsion control unit are located on the upper level.

Main Turbine Construction

The main turbines are of the usual Westinghouse combined impulse and reaction type. The turbine and generator are connected by means of a solid coupling, thus forming a three-bearing unit with two bearings on the turbine and one on the generator. Each part of the set rests directly on the foundation built into the ship structure.

On the turbine rotor, a solid annealed carbon steel forging, are mounted two rows of impulse blades and 29 rows of stainless steel reaction blades. These blades are all secured to the rotor by means of specially shaped shanks fitting in grooves and by wedges. The reaction blades are lashed together in small groups. The impulse blades in the second row are held together in groups by a strip peened and silver soldered into a groove machined in the blade ends. This construction makes an extremely rigid rotor.

The turbine cylinder is split horizontally and vertically, the high pressure section being made of cast steel and the low pressure section of cast iron. This cylinder carries one row of impulse blading and 29 rows of reaction blading held in place in grooves by soft brass offset keys and by steel packing pieces, the blades being lashed together as on the rotor.

The turbine is supported at three points, thus determining its position in a single plane and eliminating possible distortion of the cylinder. A foot is cast integral with the cylinder base on either side of the exhaust, these feet resting on the foundation. The high pressure end of the cylinder base is supported on a short I-beam section, placed in a transverse direction. The web of this I-beam furnishes the necessary flexibility to allow for any longitudinal movement due to expansion and contraction of the cylinder. The exhaust opening is in the bottom of the cylinder, the main condenser being mounted directly beneath. Two openings are provided in the cylinder base for bleeding steam for feed water heating.

There are four nozzle blocks of Everbrite metal, each containing a number of nozzles. One block is located in the cylinder base and the other three in the cylinder cover. Suitable chambers are cast in the cylinder to provide passages to direct the steam to each of the nozzle blocks separately. Rotor shaft glands are of the combined steam-and water-sealed type. Steam sealing is used in starting only, the water sealing being effective at all speeds above one-quarter speed on the turbine.

Sensitive Hydraulic Type Governor

The steam chest is of the 4-valve, automatic type. The valves themselves are of the double seated poppet type mounted in parallel with the chest. These valves are connected to the governor operating pistons by means of a linkage. The secondary, tertiary, and quaternary valve operating levers are provided with a tension spring which holds its adjacent valve closed until the preceding valve has been fully opened. The governor is of the oil operated type. Steam inlet valve opening is inversely proportional to oil pressure, and oil pressure is directly proportional to turbine speed. Thus constant speed is maintained for any particular governor setting. This makes a very sensitive and quick acting governing system.

In the governor lay-out there is provided an oil-pressure relay which is connected through a small pipe to a control valve on the main control board. From this control valve a drain pipe is led to the oil reservoir. By changing the opening of this valve in the relay line the pressure on top of the relay may be adjusted, which means that the turbine can be set for operation at any speed from one-quarter to full speed and still be under the control of the governor at all times. Thus, the only connection required between the turbine governor and the main control board for changing the turbine speed is a small oil pipe.

At the high pressure end of the turbine is mounted an automatic stop governor arranged so that it will close the throttle valve and shut down the turbine in case of excessive speed or in case of failure of the thrust bearing resulting in axial movement of the spindle. The throttle valve is held open against a spring by oil pressure so that any failure in oil supply automatically shuts off the steam.

The oil for operation of the governor and throttle valve and for complete lubrication of the turbine generator sets is supplied by one of two turbine-driven, vertical, centrifugal type, lubricating oil pumps. These pumps are on the lower engine room level, submerged in the oil reservoir. From the pump discharge a part of the oil is led directly to the governor operating cylinders, another part to the throttle valve operating mechanisms, and the rest to a cooler. From the cooler, part of the oil is led to the oil impeller suction on the turbines and the remainder is led to the gravity feed tank in the engine room trunk. This gravity tank supplies the main bearings of the turbines and generators. The oil impeller on the turbine shaft operates the governor relays and lubricates the turbine thrust bearings. Drains are provided from all points back to the reservoir. Either main lubricating oil pump has capacity to supply the normal needs of both main units. With one pump running, if pressure drops to a predetermined value, the other pump will be automatically started. A De Laval No. 302, motor-driven, centrifugal separator insures clean lubricating oil for the turbines and the propulsion motors.

Main Generators Develop 10,200 kilowatts Each

Each main generator is rated at 10,200 kilowatts, 4,000-volts, 2,660 revolutions per minute, and is of the 3-phase, 2-pole type. In the frame construction, structural steel shapes are welded into form to give a very rigid frame of minimum weight. An unusual arrangement has been provided in that an outlet can be opened at the top of the frame to permit cooling air to discharge directly into the engine room in case the water cooler in the closed ventilating system should become inoperative.

The stator core is made up of the best grade of segmentary steel laminations, there being six segments per circle. Each segment has two anchor notches that fit over the punching support rods mounted in and welded to the frame. Throughout the core, H-shaped spacers are used approximately every two inches to provide passages for ventilating air. Layers of paper punchings are placed at intervals throughout the core to reduce circulating current in the laminations. Twelve through studs pass through

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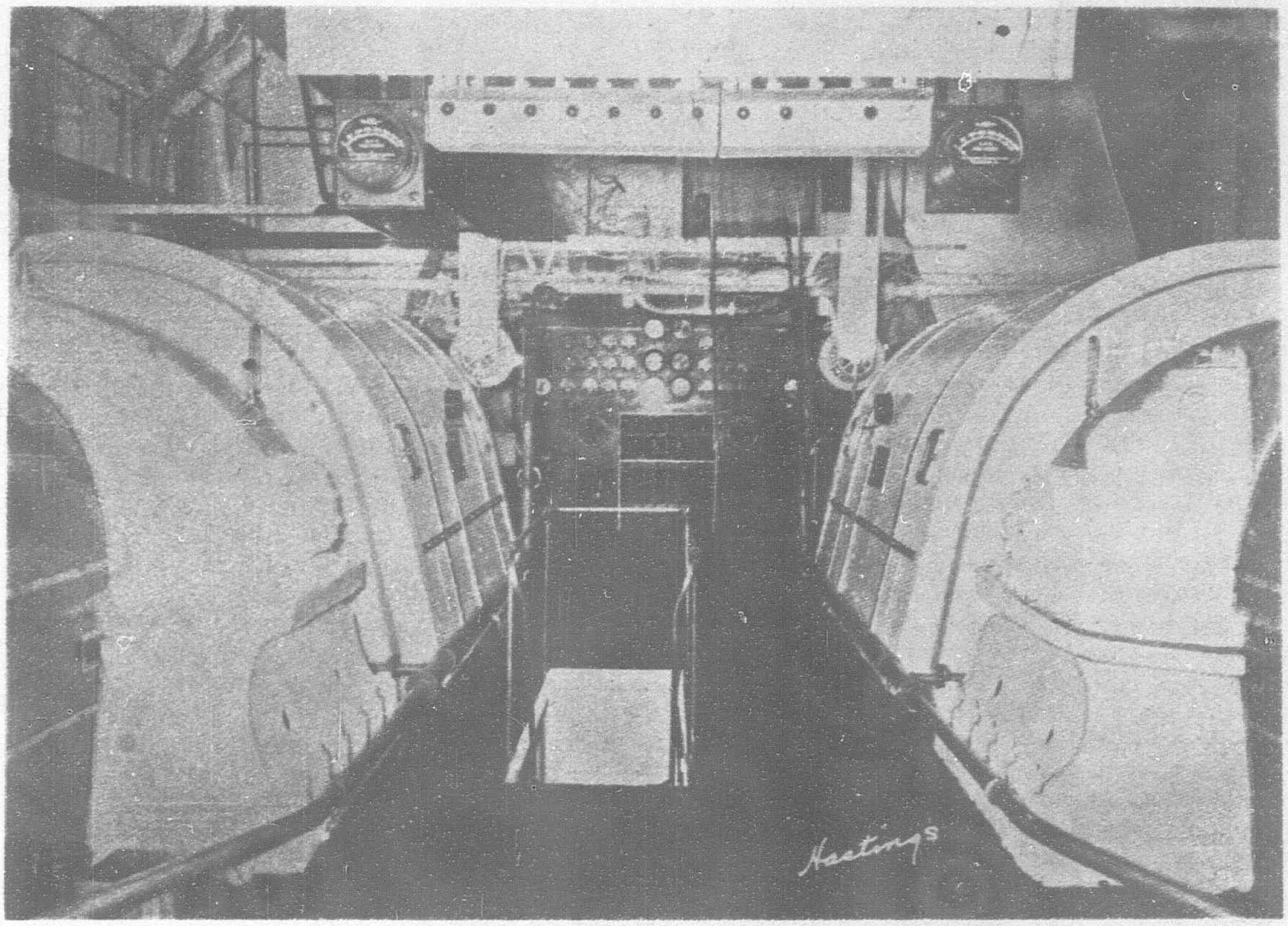
*Manager Marine Engineering, Westinghouse Electric and Manufacturing Company.



Operating platform of the engine room of the s.s. "President Coolidge" showing two 15,000 h.p. Westinghouse main turbo-generating sets and the control stand

the punchings and end plates, thus providing support for the end plates and giving a very compact lamination assembly. These bolts are insulated both from the laminations and the end plates. The coil slots are of the open type and the coils are held in place by micarta wedges.

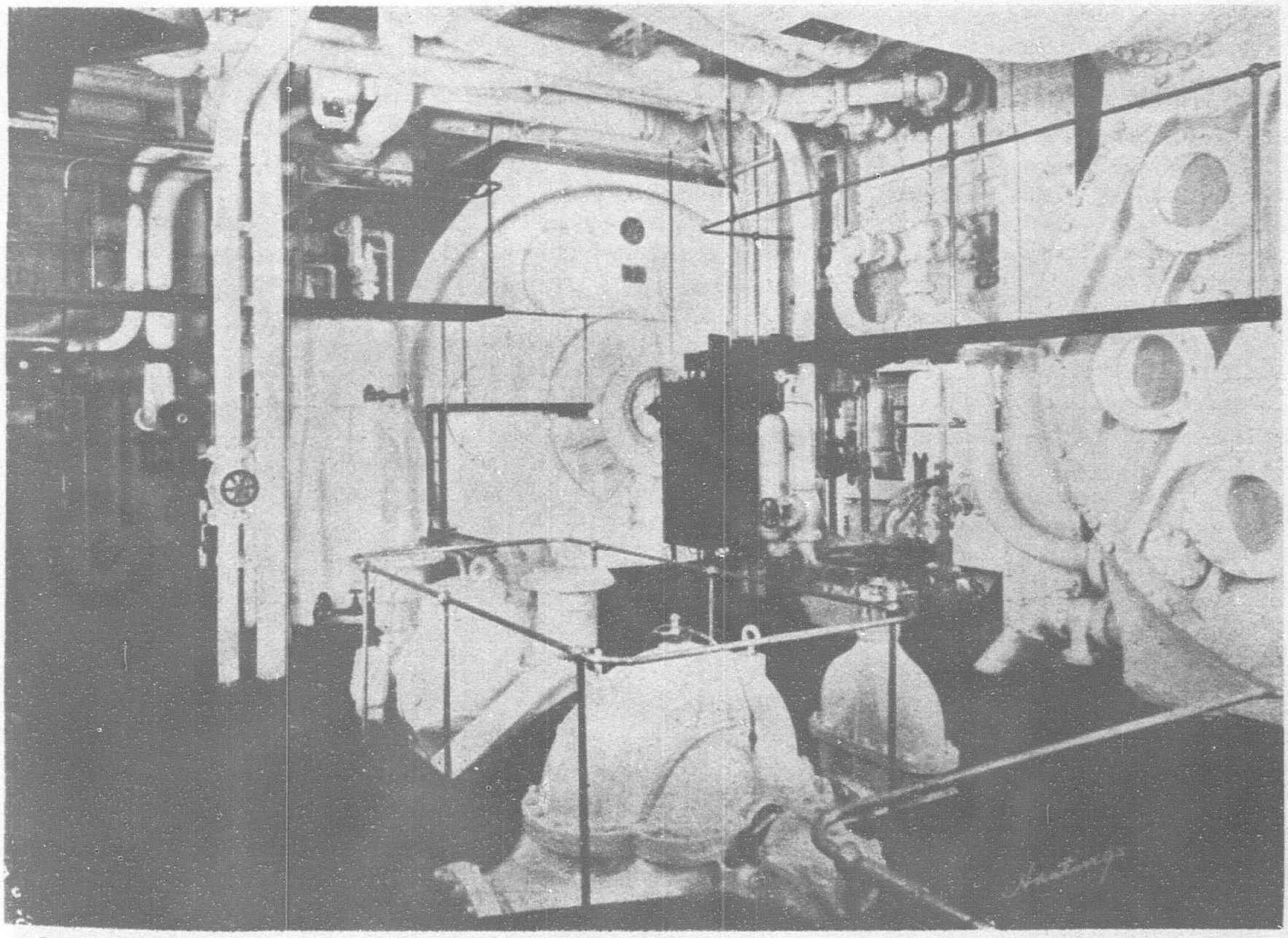
The best grade of mica insulation is used on the stator coils. In addition to special insulation of the individual strands of the coils, the completed coil is insulated from the slot portion with a black bond mica folium wrapper. This material was developed primarily for use on high voltage machines. Coil end connections are securely supported and braced by triangular shaped pieces of micarta and the coils are rigidly braced to one another by means of treated hardwood blocks.

Each end of the generator is provided with two end bells made from sheet steel, welded. The inner end bells enclose the stator end windings, while the outer bell provides the air space for directing the ventilating air. Labyrinth sealing glands are provided in the outer end bells to prevent leakage of the ventilating air. Fans mounted on the generator rotor circulate air through machine and through coolers mounted just below the generator foundation, thereby eliminating large ventilating ducts and reducing to a minimum the noise which usually results from air circulation in a high speed rotor. Water for the air coolers is taken from a connection on the discharge pipe between the main condenser circulating pump and the condenser intake.

The generator rotor is a solid steel forging, machined with radial slots to receive the field winding of strap copper insulated in molded mica cells. Grooves cut below the coil slots and holes drilled through the rotor teeth form ventilating air passages.

For convenient measurement of stator temperatures, nine resistance coils are embedded in the armature winding and located so as to give the highest temperature obtained in operation. The instruments for measuring the temperatures are mounted on the main control board.

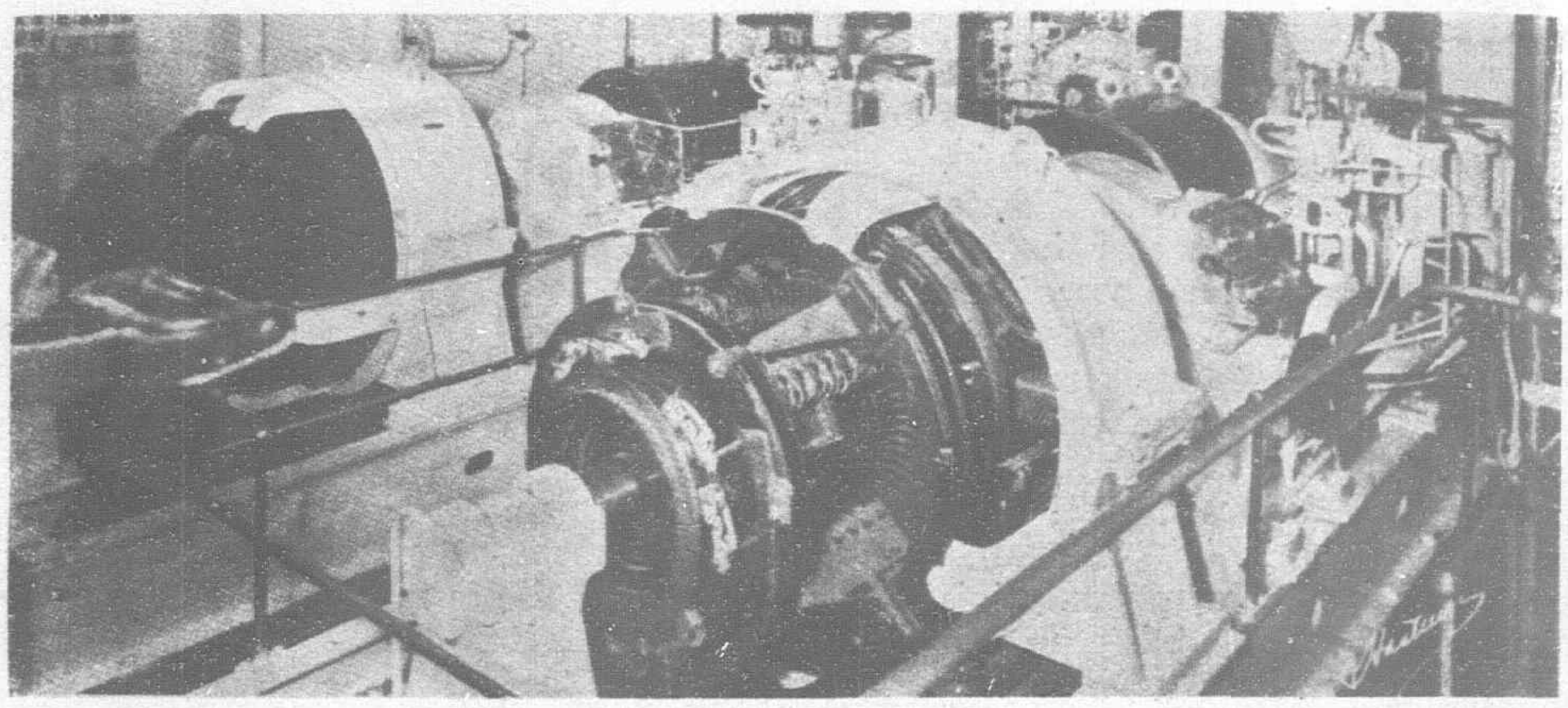
For fire protection, sprinkler pipes installed in the end bells, opposite the air gap are connected up to a fresh water system with valves arranged for emergency use. Electric heaters are installed underneath the stator end windings to prevent moisture from collecting during idle periods. There are two 750-watt heaters at each end of the machine.



Lower engine room platform of the s.s. "President Coolidge" showing the starboard Westinghouse 13,250 h.p. propulsion motor

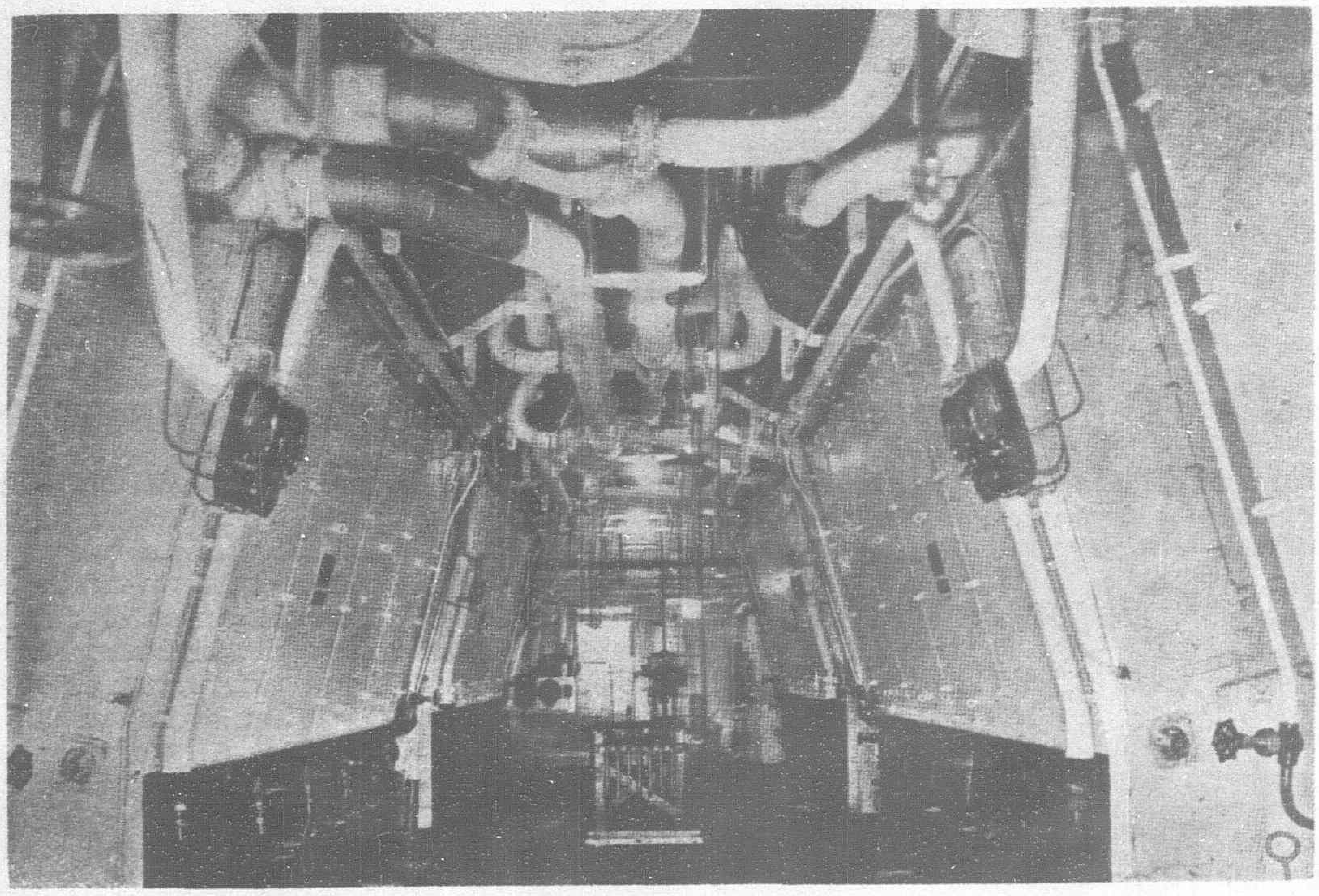
First Completely Fabricated Synchronous Propulsion Motors

The propelling motors are of the synchronous type, each rated 13,250 horse-power. They have 40 field poles, thus giving a speed reduction ratio of 20 to 1 between the main turbine and the propeller shaft. Thus the normal motor speed at full power is 133 revolutions per minute. Of the self-contained, 2-bearing, bracket type, these motors are entirely fabricated from steel plates and shapes by welding, the only castings used being the bearing housings and shells. The design of spider worked out for this installation resulted in an extremely strong construction with uniform stress distribution and with minimum weight. Each motor is separately ventilated by means of a motor-driven, propeller-type blower which is mounted directly in the air passage duct in the engine room trunk. This blower is arranged so that it forms a part of the duct, thus eliminating foundation, requiring minimum space, and providing a very efficient blower. The driving motor is of the vertical type and mounted just below the blower unit. Ventilating air for the motors is taken out of the engine room and exhausted through the after funnel.



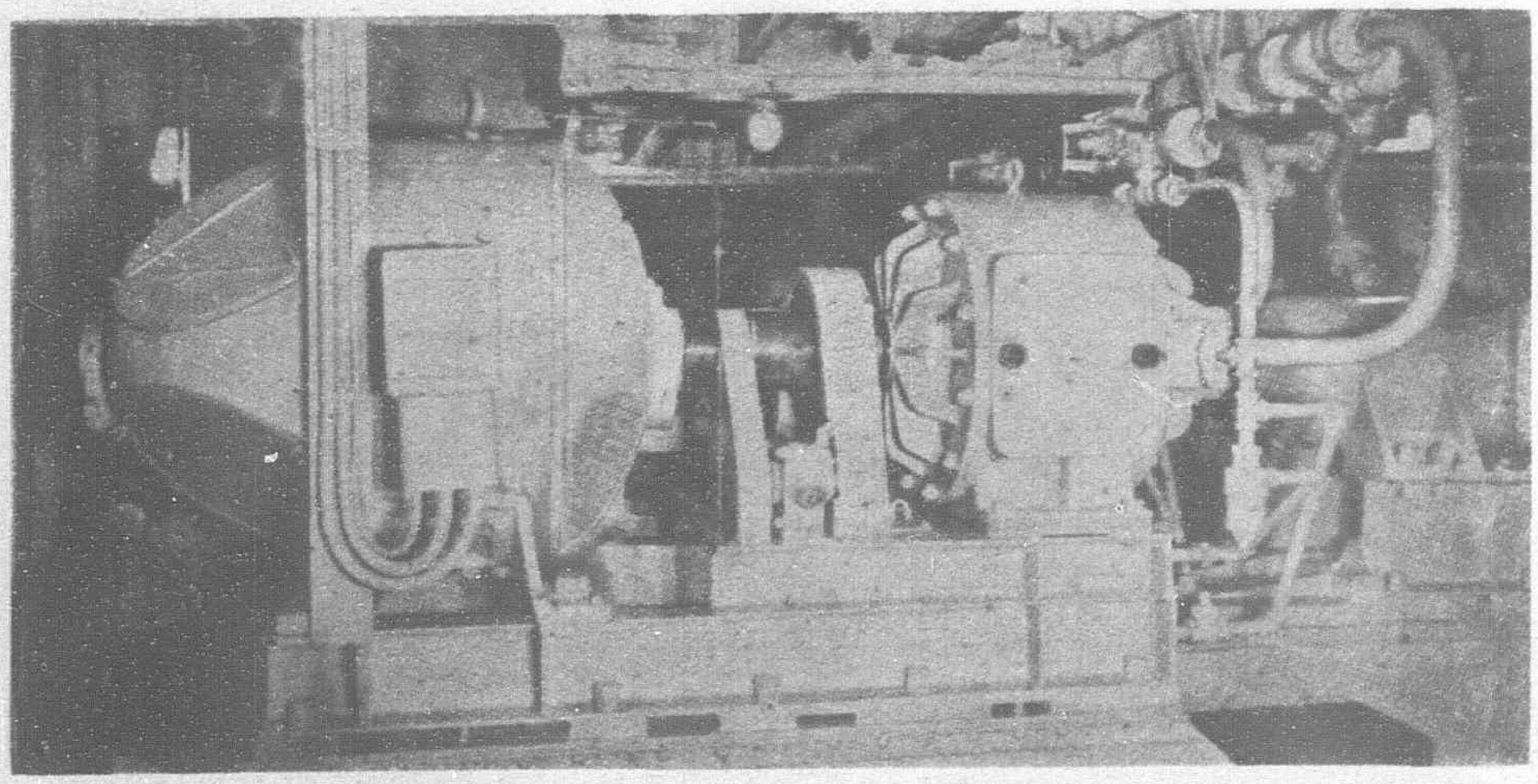
Dynamo Flat of the "President Coolidge" on which are mounted four 500 kilowatt Westinghouse geared turbine, 240-volt, 1,200 r.p.m. electric generating sets to take care of auxiliary electric power, excitation load and lighting load

The motor stator frame is of the rigid box section type, welded from steel plates with an opening at the top for discharging the ventilating air. The stator core is built up of steel laminations of the best grade, there being 20 segments for a complete circle of punchings. Vent spacers are provided every two inches through the core width. The stator coils are completely formed, molded, and insulated with Class A material and mica. The coils are held in the slots by fiber wedges. The coil ends are lashed to insulating steel supporting rings. The brackets are made from heavy steel plate, forged into a dome shape with reinforcing radial arms and rings welded inside the plate. Six circular screened openings are provided in each bracket for entrance of the ventilating air. Bearings are of the sleeve, oil-ring type having two rings per bearing designed to permit operation with permanent inclination at 15 degrees laterally or longitudinally. These bearings are also supplied with forced-feed lubrication from the gravity tank, and are provided with illuminated side flow indicators and thermometers in the discharge oil line.



One of the firerooms of the "President Coolidge," showing the neat installation of steam piping and featuring the furnace fronts of four of the twelve Babcock & Wilcox interdeck, superheat type, marine, watertube boilers. The high pressure steam pipes are covered with 85 per cent magnesia and with Johns-Manville super-ex insulation material. Fuel oil for these boilers is measured by Empire Oil Meters

The field poles are arranged with slots in the pole head for the bars which form the squirrel cage maneuvering winding. This squirrel cage winding is connected between poles by means of heavy bolts held by lock washers. The field coils are made of copper strap wound on edge and provided with mica and asbestos insulation. The brass alloy collector rings and brush rigging are mounted at the forward end of the motor inside the bracket.

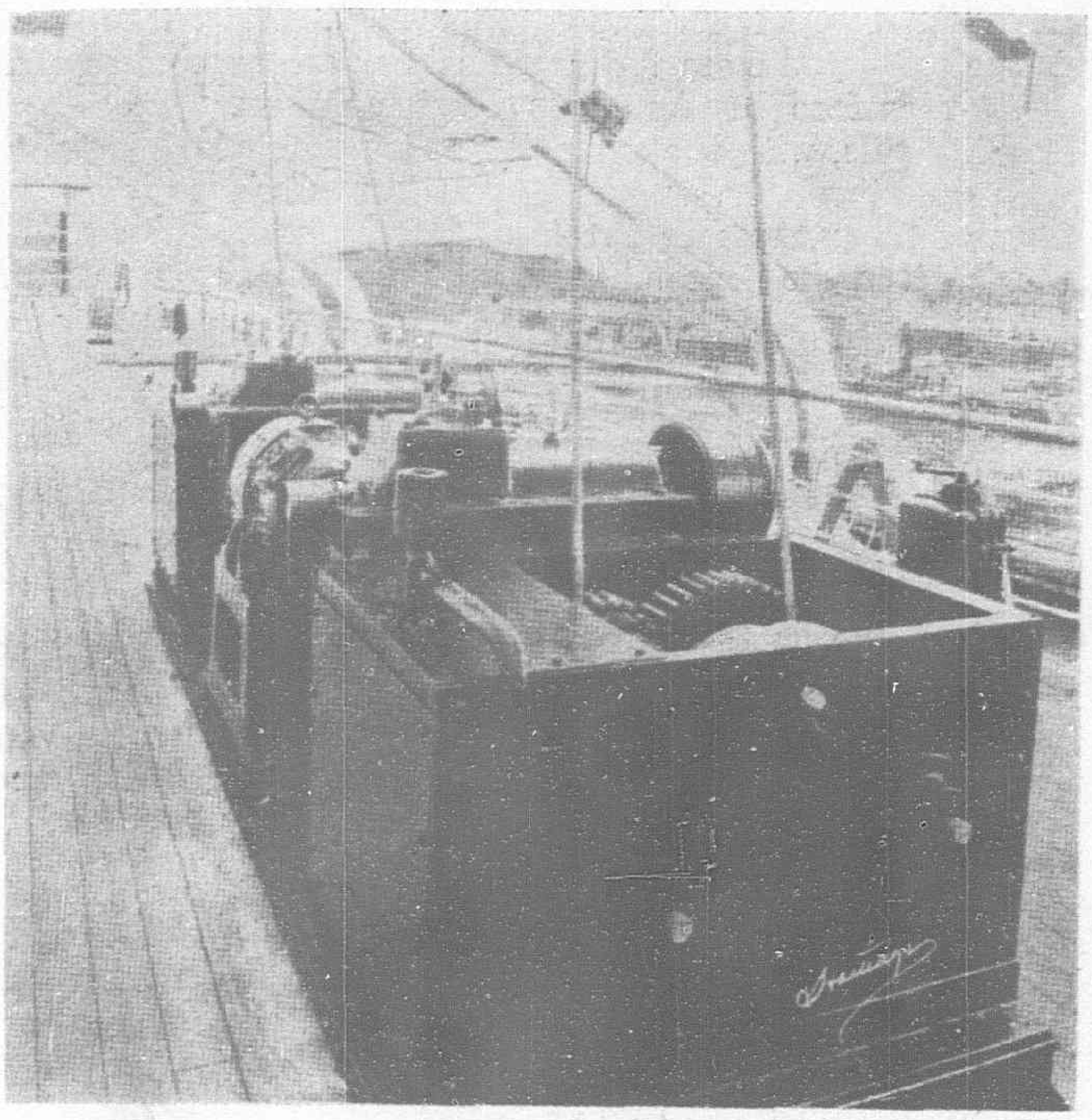


Steering gear of "President Coolidge." In foreground is shown 75 horse-power Westinghouse motor driving a Waterbury hydraulic pump. Two of these units are installed, each capable of providing hydraulic power to operate the hydraulic rams of the steering gear. This gear and its control are furnished by the American Engineering Company

The propelling motors are provided with fresh water fire protection arrangement and heaters in the lower part of the motor frame for use when the machine is idle. The heater capacity at each end of the motor is two kilowatts.

Main Control in Two Units

The propulsion control equipment is mounted at the after end of the upper engine room level and is housed in two compartments surrounded by a protecting metal screen. In the after compartment are mounted the 1,500-ampere, 4,000-volt, manually operated air break switches in the circuits between the propelling motors and generator stators. These switches are used for reversing two phases of the primary circuits to effect reversal of the propelling motors. This compartment also contains the necessary current and potential transformers and the change-over switch, which is used to make proper connections



Westinghouse motors driving the winches for handling the Welin life-boats on Welin-MarLauchlin davits

for operating both motors from either generator alone. The access door to this compartment is provided with an interlock connected in the trip circuit of the generator field circuit breaker, so that opening the door removes voltage from the generator.

In the low voltage compartment are mounted the switch groups carrying the manually operated contactors for making the necessary motor and generator field connections.

These field and reversing switches are operated from levers mounted in a control desk which is made a part of the front panel of the control assembly. This desk carries seven levers, two for adjusting the speed of the two turbines, two for operating the port and starboard field switches, two for operating the corresponding reversing switches, and one in the center for operating the change-over switch. With the ship operating on both main units, the control levers on both sides can be brought to the "off" position, which will allow the change-over lever to be thrown to either the port or starboard generator, after which the motors can again be started, taking power from the single generator. This complete change-over in set-up connections can be made in less than one minute's time.

Both the main generator and propelling motor field rheostats for one side of the ship are incorporated in a single frame with face plate contact arms geared to one operating hand wheel on the control board. The design of these rheostats was very carefully worked out in conjunction with the test data taken on the machines in such a way as to provide practically 100 per cent power factor for any setting of the rheostat hand wheel. Furthermore, for single generator operation, the port and starboard generator and motor field rheostats are clutched together by a simple device mounted above the control levers so that both sets of rheostats are operated from one hand wheel on the side of the board which is being used in single generator operation. Under this condition, also, the power factor is maintained between 99 and 100 per cent for any setting of the rheostats. The control levers are ingeniously interlocked to insure correct sequence of operation.

The panel above the control desk carries all the necessary electrical instruments as well as steam pressure and vacuum gauges for the complete record of the operation of the propulsion plant. This panel also carries the phase balance relays used to protect the generators and motors against unbalanced conditions, such as would be caused by a ground. In this case, these relays function to open the generator field breaker. The control panel also carries temperature indicators to measure the temperature of the generator rotors and the nine temperature indicating coils in each main generator stator and corresponding six coils in each motor stator. On each side there is also a triplex ground dtecetor voltmeter to indicate grounds on any phase.

The propulsion motors turn outboard for driving the vessel ahead, the starboard propeller being a right-hand screw and the port propeller a left-hand screw. Thrust is taken on independent Kingsbury two-shoe type bearings immediately aft of the motors. Propellers are of the built-up type with three manganese bronze blades and semi-steel hub. Blade sections are of the standard ogival shape.

Auxiliary Turbine Generators

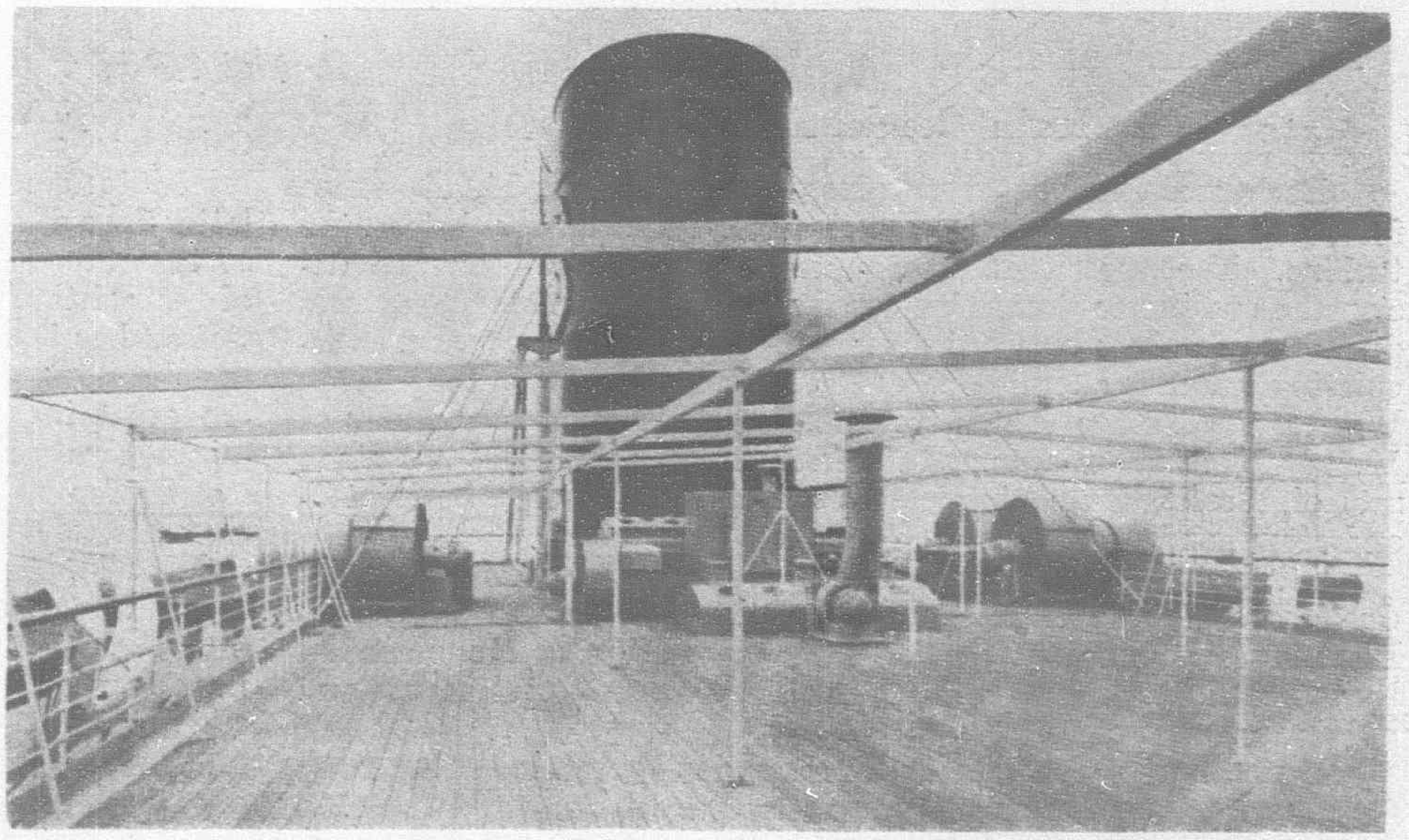
Steamship *President Coolidge* has four 500 kilowatt, geared-turbine generator sets to supply direct-current for auxiliary electrical power load, excitation load, and lighting load. Under normal conditions, two of these generating sets will supply sufficient power for all purposes. Under peak load conditions, such as at meal time and when operating in the tropics and with a large refrigeration load, three generating sets will be in operation. This always leaves one unit as a spare.

The turbines driving the auxiliary generators are of the combined impulse and reaction type. The forged rotor spindle carries two rows of impulse blading and 18 rows of reaction blading. The cylinder carries one row of impulse blades and 18 rows of reaction blades. The gear end of the turbine casing is supported by the gear case and the exhaust end by a plate which is bolted to the cylinder and the structural steel bedplate. This plate forms a flexible member which allows free expansion of the turbine cylinder. The turbine rotor is carried in two bearings and is provided with a Kingsbury thrust bearing. Glands of the labyrinth and water sealed type are provided at both ends of the casing.

The auxiliary generators are compound-wound and each is rated at 500 kilowatts, 240-volts, 1,200 revolutions per minute. They are limited 3-wire machines providing 120-volt power for normal excitation of the propulsion generator fields. Balance coils are used to obtain the 120-volts between the neutral and positive or negative leads. These coils are of the oil-cooled, marine type mounted in welded sheet steel tanks, with radiation tubes on the sides of the tank.

The generators are of the rugged marine type with rolled steel frames and are of the completely welded type, resulting in a very compact machine with minimum weight and uniform magnetic circuit.

The four auxiliary generating units, with the auxiliary switch-board, are located on a flat on the port side of the upper engine room level. This switch-board carries the control apparatus for the generating sets, the necessary feeder switches for the ship's



Sun deck on the "President Coolidge" showing Westinghouse motors driving Sturtevant Silentvane blowers for the exhaust and supply ventilating systems auxiliaries, and the control for two 300-ampere balancer sets which supply 115-volt power for the lighting circuits. Each balancer set consists of two compound-wound, direct-current, 120-volt machines coupled together and mounted on a bedplate.

Steam Generating Plant

Steam for these main and auxiliary turbines is generated at 300 pounds pressure and 200 degrees Fahrenheit superheat in 12 water-tube boilers of the well known Babcock & Wilcox interdeck, superheater, marine type. These boilers are located in two boiler rooms, six boilers in each room arranged three abreast with drums athwartship. The forward stack takes the flues from all boilers, the after stack being used solely for engine room ventilation. Steam drums of the three forward and three after boilers are fitted with desuperheating coils for furnishing steam to the saturated steam auxiliaries. The total heating surface of the 12 boilers is 57,600 square feet, and the total superheating surface is 5,700 square feet. Each boiler is fitted with four Babcock & Wilcox Cuyama-type burners for burning fuel oil under cold forced draft. Diamond soot blowers and Babcock & Wilcox automatic feed regulators are fitted.

All high pressure steam pipes are insulated with 85 per cent Magnesia and with Johns-Manville Super-Ex pipe coverings. For low pressure steam pipe insulation and for insulating bulkheads and partitions, large quantities of Johns-Manville improved Asbestocel are used.

In each boiler room are installed three Griscom-Russell fuel oil heaters, two of which have sufficient capacity to take care of the full load demand for six boilers. One Quimby horizontal motor-driven fuel oil pump in each fireroom supplies all 24 burners, and two Warren steam-driven vertical simplex oil pumps are installed as stand-by. Air is delivered to the burner fronts through ducts on the open fireroom system by four motor-driven Sturtevant Silentvane blowers.

Feed Heating System

The condensate is drawn from the main condensers by the condensate pump which discharges through the air ejector condensers to the feed tank. All the latent heat of ejector steam is thus conserved, no raw water pass being fitted. There are two Warren 3-stage centrifugal main feed pumps, each driven by a Terry turbine. Each main feed pump has sufficient capacity to supply all the boilers at full power. There are also three Warren independent steam-driven vertical simplex auxiliary feed pumps, one in the engine room and one in each fire room. The feed pumps draw from the feed tank and discharge through two Davis Engineering Company's heaters arranged in series and having sufficient capacity to heat the feed water to 300 degrees Fahrenheit. The first stage heater utilizes the exhaust from the steam-driven non-condensing auxiliaries, augmented by steam bled from the eighth stage of the main turbines. Steam for the second stage heater is bled from the third stage of the main turbines.

Main Condensing Plant

Each main generator turbine is served by a 14,000-square foot, 2-pass, surface condenser located immediately below the turbine. The condensers are supported on flexible beams so designed as to insure protection for the turbines from undue stresses due to the weight or vertical expansion of the condensers. Circulating water is supplied to each condenser by two motor-driven Warren single-stage centrifugal pumps each having a capacity of 10,000 gallons per minute. Each condenser is served by two 2-stage sets of Westinghouse air ejectors mounted on a combined inter-and-after condenser.

All electrically operated auxiliaries on the steamship *President Coolidge* are equipped with Westinghouse motors. Westinghouse Electric & Manufacturing Company supplied also the electrical heaters for state rooms and all bracket fans for state rooms and public rooms.

On both of the new Dollar liners, the wire rope for rigging and for all hoists was supplied by the Wickwire Spancer Steel Co., a total of 20,795 feet going to each vessel. On both vessels the refrigeration spaces are insulated with Armstrong corkboard and the cold pipe lines with Armstrong cork covering. More than half a million board feet of corkboard were used. The hulls of both vessels are protected from the elements and are assured of a clean under-water surface by American Marine Paints.

In all details, with the exception of the machinery installation as herein described, the steamship *President Coolidge* is an exact duplicate of the steamship *President Hoover*, which was described in great detail in the September issue of the *Far Eastern Review.*

The Diesel-electric Suction Dredger "La Sangsue"

(Continued from page 775)

upper end of the suction pipe is connected by a flexible metal-armored leather hose with a 90 deg. pipe bend built into a rail guide on the side of the ship. Tensile and compressive forces are absorbed by rugged structures placed laterally along the hull. A trailing cable attached to the suction head takes in particular the forces arising during the operation of dredging. The suction pipe, which is entirely covered by water during work, together with the leather joint and pipe bend, can be quickly raised to deck level by means of special hoists provided for this purpose, and in this position can be swung on to the deck and stowed away. A shut-off provided in that part of the suction pipe within the ship permits the suction line to be completely sealed against outboard water whenever this is necessary for working on the pipes and dredging pump.

The pump impeller is of the open type, and is made of a special grade of high-tensile material. A swinging pressure line to port serves for loading barges alongside of the dredge. This pipe also carries a crosswise distribution pipe at the end, to cause the sludge and water mixture to run off slowly.

In the continuous hard service to which this dredger has been exposed ever since its delivery, it has proved to be of ample strength in every part, and altogether has shown itself to be fully qualified for the work which it is required for.

Britain's Destroyer Policy in China

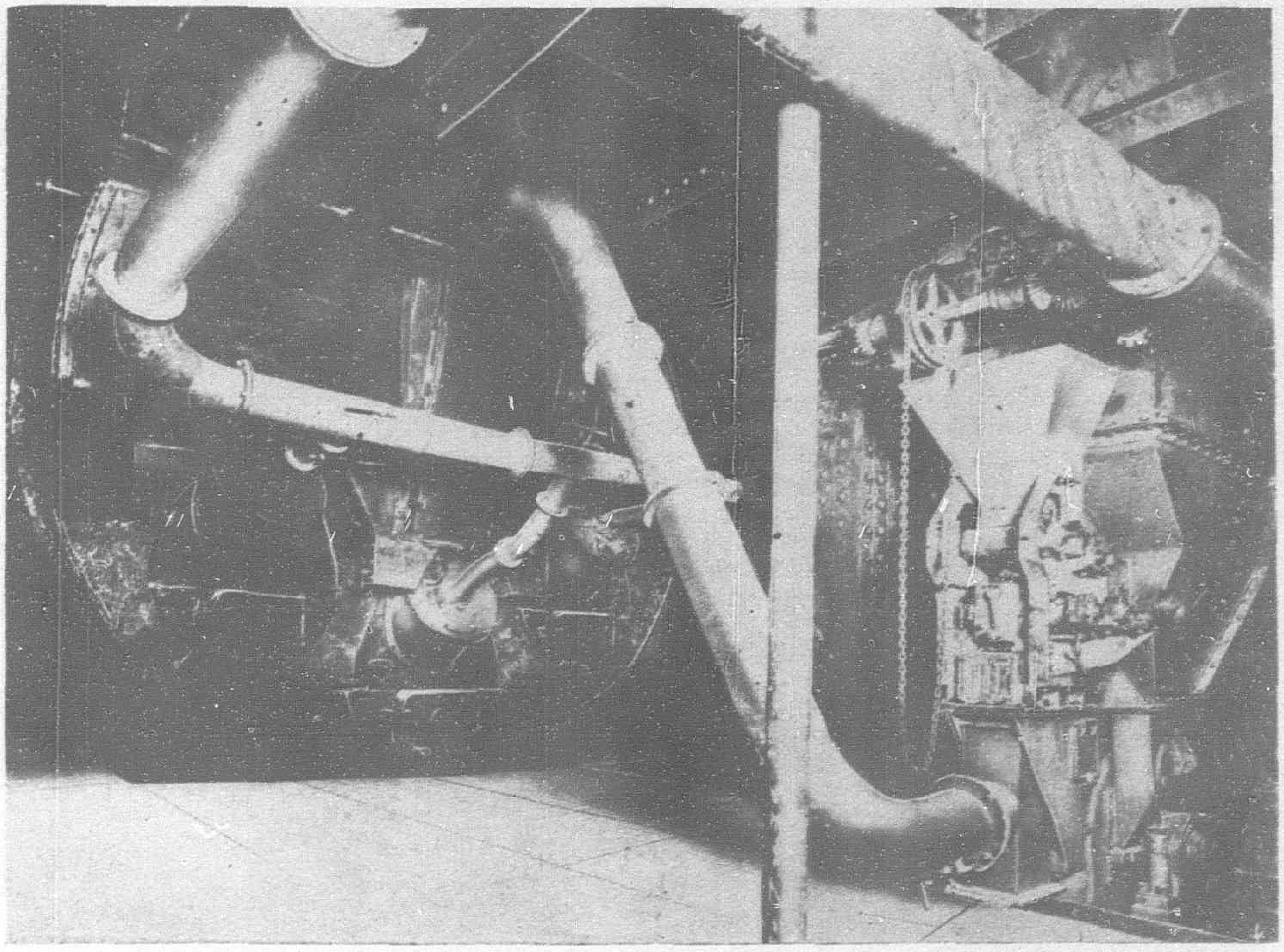
Previous to the war the British policy of keeping destroyers on the China Station was a rather half-hearted one, and after the war it was for a time abandoned altogether. It was started again when the disorders in China arose, and it has been continued since then on the urgent representations of the shipping interests in China, who regard the destroyer as being the very finest ship for police purposes, and who admit that she has checked piracy, which is the curse of Eastern business, very considerably.

Some time ago it was announced that the ships of the S type in the Eighth Destroyer Flotilla would be relieved by newer ships of the W type, and the admiralty has now published orders by which the ships which will replace the first division will sail for China early in November, the second division to follow after a brief interval. The ships of the S type were only finished in the latter days of the war, and few of them have seen really hard service, so that the definite announcement that they will follow so many of their sisters to the scrappers immediately they return to British waters has been received in some quarters with considerable disappointment, for Britain's reserve in ships of this type is none too great in any circumstances, and in a sudden disorder they might give welcome aid.

So far as the China Station is concerned there is no doubt that the newer vessels will give a greatly added police value to the flotilla, for although they are not quite so fast, they are far bigger and roomier vessels, while their guns permit them to fire over the river banks which so often protect the bandits who have been causing trouble to shipping. The ships of the S class, of which nearly 50 were built during the war, were not the most successful British destroyer type, and although their hulls and engines are still in first-rate order and they are still capable of a very high speed, the boilers of most of them requiring retubing, and at the present time the Admiralty, faced with the necessity of economizing on all sides, cannot afford to incur the expense.

Pulverized Fuel Firing for New Japanese Vessel

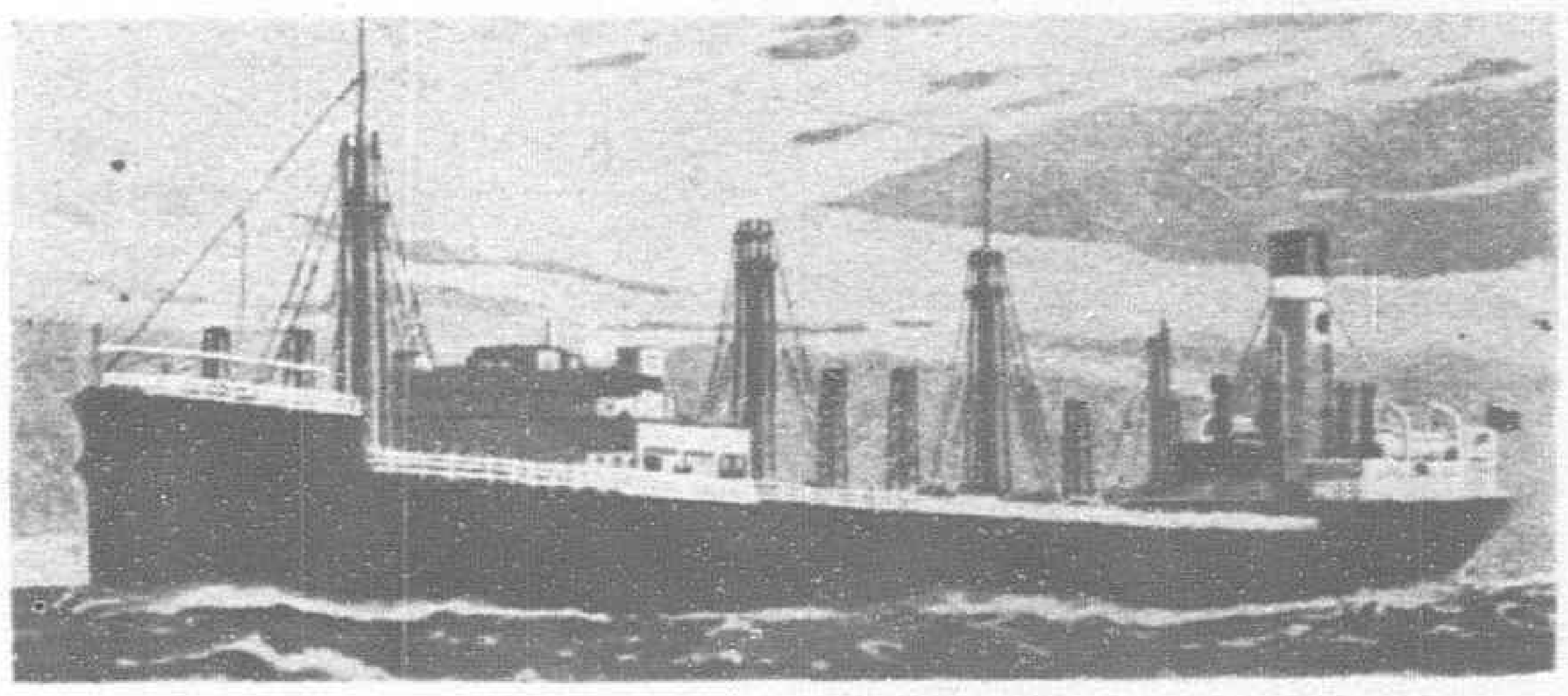
Modern Methods of Marine Steam Generation



"Resolutor" Pulverizer Equipment (Clarke Chapman & Co., Ltd., Gateshead-on-Tyne) on S.S. "Berwindlea" showing Hot Air and Fuel Pipes

During the past year or two much attention has been concentrated upon the subject of pulverized fuel firing for steamships, both as regards water tube and "Scotch" cylindrical boilers. The definite progress now being made in this important field is well indicated by the fact that a new Japanese passenger and cargo boat, to be built at the Harima Dockyard for the Ishihara Sangyo Kaiun Kisen Kaisha will be operated with "Resolutor" pulverizers, supplied by Clarke Chapman and Co., Ltd., Gateshead-on-Tyne.

The steam generation plant is to consist of three single ended "Scotch" boilers, each with three furnace tubes, operating at 225 lb. per square inch gauge pressure, the heating surface also being 2,850 square feet, that is 8,550 square feet total. For the firing of this plant three "Resolutor" pulverizers are to be installed, each of 0.75 tons of coal per hour capacity, supplying one boiler, having three "Woodeson" patent short flame turbulent burners fitted. Also the firm's patent ring system of pipe distribution is included for the complete installation of three boilers, three pulverizers and nine turbulent burners. Interesting also is that the pulverizers are to be driven by direct coupled steam engines, which is found by previous practical experience, under marine conditions, to operate equally as well as the electric motors generally used for the purpose, while a special equipment of ash ejector equipment is also being provided from Gateshead.

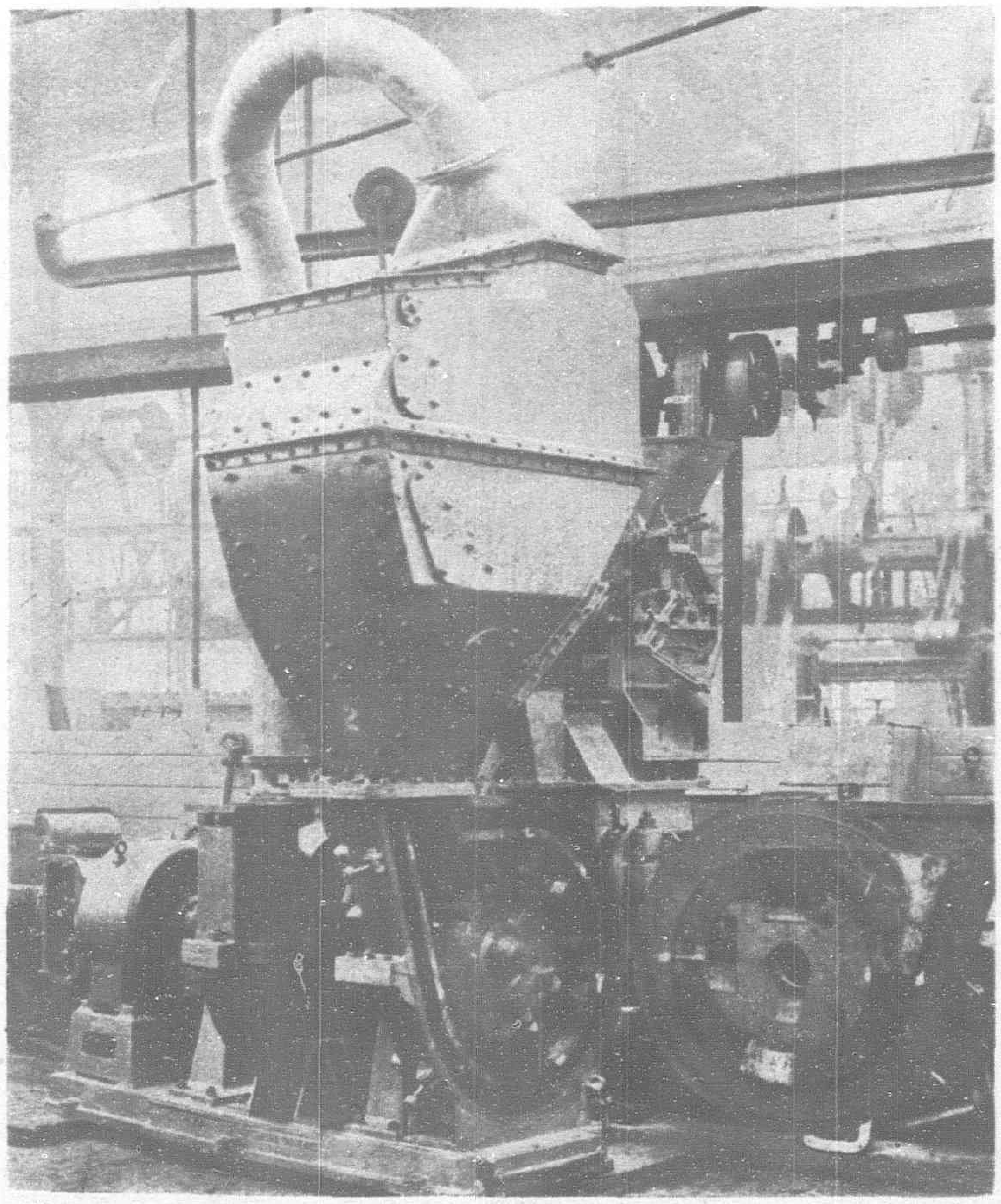


S.S. "Berwindlea"

This will make eight vessels now fitted with "Resolutor" pulverizers, the others including the *S.S. Berwindlea*, a British built collier operating with great success for the Berwind-White Co. of New York engaged on the United States-Havana service, and the *S.S. Stassfurt* a "Hamburg-Amerika" vessel on the Australian service. Notable also is the *S.S. Donau*, the tug boat *Metz*, and the dredger *Bassure de Baas*. The *Berwindlea*, according to a recent report by her owners, has made 57 voyages averaging about 1,000 miles each and every satisfaction has been given by the performance of the pulverized fuel plant so that obviously this method is now well established in strong competition with oil firing having equal advantages in the way of convenience and good stokehold conditions, but using cheaper coal instead of oil.

In general the "Resolutor" pulverizer consists of a high speed runner disc in a pulverizer chamber with renewable chrome steel beaters and chamber linings, a gravity separater chamber, adjusting mechanism to control the degree of the grinding, and a fan, all of a common shaft, direct coupled to an electric motor or steam engine, while the turbulent burners ensure the completion of the combustion in a flame not over six feet long, giving about 14-15 per cent Co_2 in the combustion gases.

Also the degree of grinding is equivalent to about 82 per cent through a 200-mesh screen and both primary and secondary air are provided, the former being preheated to about 500° F. passing through the pulverizers so that damp coal up to 20-25 per cent moisture is taken direct, thus eliminating the troublesome practice of pre-drying. The fuel and power consumption is also extremely low, the figures for the *Berwindlea* for 57,230 miles of steaming averaging 16.8 kw. per ton of coal pulverized, including the fan, with 1.28 lb. of coal per i.h.p. with triple expansion engines when steaming at sea.



Standard "Resolutor" Pulverizer for dealing with up to one ton of coal per hour with Pulverizer Chamber open for Inspection

Engineering Notes

INDUSTRIAL

YAWATA WORKS ENLARGES.—In line with the policy of the Tokyo Department of Commerce and Industry for a positive industrial development and for checking imports of various commodities, the Yawata Iron Works, the powerful government establishment, has decided to increase its tin plates production from the present annual amount of 20,000 tons to 50,000 tons. According to a reliable report that Yawata Iron Works is making arrangements with the Deposits Bureau of the Department of Finance for funds required for the proposed extension plan. This extension in the iron works, it is said, will save some Y.6,500,000 annually for the nation, estimating that the nation imports 50,000 tons of tin plates each year at the price of Y.172. Based on the prevailing market prices, the cost of tin required for 1 ton of tin plates is set at 42 yen.

CONSTRUCTION IN KUZNEZK.—The construction of the giant of the Soviet metalurgical industry, the Kuznezk, works, can in the main be considered as completed. A number of large constructions have been completed as, for instance, the water-supply system, solving the problem of supplying with water not only the Kuznezk works, but also the immense coal region of the Kuzbass-Prekoffieval. Another lately completed construction shall be mentioned : 5 powerful blowing engines, intended at the same time for the needs of works to be constructed in second place. Much work has been done in regard to railway construction, 120 Klms. of railways being built in that area. The second in importance is the coke department, doing a very complicated and responsible work. The main part of its construction has been completed and the coke furnaces are ready for drying. The construction of the first blast furnace shop is also completed. The water supply system for this shop is almost ready. The construction of the Marten shop is fully under way. Foundations are laid for ten furnaces, although four only were provided for in the schedule of constructions of first importance.

FOR CHINESE STUDENTS.—To assist Chinese graduates of technology in obtaining practical training in engineering works and factories abroad, special arrangements for the admission of such students will be made with foreign companies abroad whenever any government organ places heavy orders for machinery or equipment with them. It is understood that owing to the world trade depression, it is not easy at present for Chinese students to acquire practical experience in engineering works abroad. The Executive Yuan has approved a joint petition submitted by the Ministries of Communications and Industry recommending the above procedure to enable a selected number of Chinese technical graduates being placed in factories and workshops abroad for a limited period of practical training. —*Kuo Min.*

The construction of additional modern primary school buildings of steel and re-inforced concrete is being planned by the City of Tokyo with an appropriation of Y.6,300,000, the period of construction to be spread over three years and a total of 22 new buildings. This will cover the second construction period in the school building program since the great earthquake of 1923. The first construction period ended last year with the completion of 117 steel and concrete school buildings to replace those destroyed in the catastrophe and 19 erected to replace old wooden structures. The second construction period is part of an extensive building program which calls for the replacement of 69 primary schools, which are old wooden structures, with more modern accommodations. The funds will be raised by a long-term loan which will nature on March 31, 1956. The expenditure will extend over three years, Y.909,259 being set aside for the next fiscal year, Y.2,534,820 for the following year and Y.2,722,491 for the fiscal year 1934.

KALLANG BASIN SCHEME.—An indication that work on the Kallang Basin scheme is to be proceeded with at once is contained in the notice issued by the Resident Engineer, Aerodrome, inviting tenders for the construction of temporary buildings at Paya Lebar (including coolie lines for 1,000 men), for excavation and transport of earth filling from Bidadari Quarry site to Kallang Basin, and excavation of earth filling at Paya Lebar Quarry.

NEW HONGKONG RESERVOIR.—A new reservoir, with a capacity of 19,000,000 gallons, is nearing completion on the Kowloon side of the bay in the Colony of Hong Kong. The width of the dam in 400 feet, and the height 110 feet. This is one of the largest undertakings in progress in South China at the present time. Work is being carried out by a Chinese firm, with an American manager. This company is the only one in the colony that uses machinery to any extent in its construction activities. Most of the local contracting companies employ hand labor extensively and have little modern construction equipment at their command.

DUTCH BREWERY.—Preparations have already begun for the building of a brewery in Batavia by the Archipelago Brewery Co. The building is expected to be finished in the course of next year and before the end of 1932 the first beer will be ready for delivery. The company has also acquired sites in Singapore, Medan and Sourabaya for building other breweries. Building has already begun in Singapore.

MAKING PETROL IN JAPAN.—A foreign correspondent reports that one of the members of the Technical College of Osaka has devised a method of producing petrol, or, in fact, two methods. Mixing a quantity of crude petroleum with 10 per cent. of catalytic charcoal and 2 per cent. of other products of a chromic basis, is allowed to stand for chemical reaction for 24 hours. The clear quantities are then separated and neutralised by alkaline soda and washed with water, afterwards dehydrated by calcium chloride. To the result 25 per cent. of alcohol is added with 1 per cent. of acetone. This treatment results in a petrol of about 90 per cent. of the crude that has been treated, and in quality is equal to the petrol spirit obtained by "cracking." The second method starts from alcohol (of which large quantities can be had from the sugar refineries) to which refined petroleum (kerosene presumably) is added with "carbon actif." But full details of this method are not yet disclosed, although said to have been fully worked out at Tokio, and the patent bought by Mitsui & Co.

RAILWAYS

TO EXPLOIT MINES.—With the approval of the Ministry of Railways, the Kiaochow-Tsinan Railway Administration will undertake the exploitation of the coal mines in the various districts along the Line. A technical expert from the Ministry has arrived here to inspect the areas having mineral deposits. Owing to the huge quantity of coal used by the Railway, amounting to about 140,000 tons annually, the Railway authorities believe it will be more expedient to provide their own sources of supply.—*Kuo Min.*

TO OBTAIN LOAN.—The South Manchuria Railway Company will obtain loans from the banks' syndicate to an extent of some Y.16,000,000, with which money the Company intends to redeem the promissory notes outstanding. The amount which was required by the Company first was Y.20,000,000, but the amount of the loan has been reduced to Y.16,000,000, being unable to obtain sufficient funds due to the tightness of the money market. According to the conditions for this loan, although they are not yet made public, the S.M.R. may pay 2 sen interest per Y.100 per diem. The Company will draw a 60-day sight bill for the loans and will renew the bill in case that the redemption is impossible.

NEW RAILWAY BRIDGES.—The Nanking Ministry of Railways has bought 2 iron bridges of 20 kilometers and 2 of 10 kilometers to replace the old ones along the Peking-Hankow Line.

LUNGHAI RAILWAY OPENS.—Train service on the extension line between Lingpao and Tungkwan on the Lunghai Railway is being opened according to a responsible officer of the Railway Administration here. Construction of the Lingpao-Tungkwan extension line of the Lunghai Railway began in 1927. Construction work along this section of the railway has been most difficult due to the irregular geographical conditions. This part of the country abounds with mountains and rivers, and the new route of train service will run through tunnels and across bridges. The two most outstanding bridge structures along the extended line of the Lunghai Railway from Lingpao to Tungkwan are the two bridges, one over the Shih Erh Li River "Twelve Li River." The other bridge is at Shoutichen, northwest of this Twelve Li River. After the opening of train service between Lingpao and Tungkwan, the construction of these two bridges will continue. It will take half a year more to complete the finishing touches to these two bridges, according to the railway officer.

HARBORS AND SHIPPING

HARBOR RECONSTRUCTION.—Director Wilhelm Sieveking of Hamburg will be the German expert, with English and French colleagues, to China to report on Harbor construction in Shanghai, in accordance with the invitation of the Nanking Government to the League of Nations.—Reuter.

INVADES AFRICAN WATERS.—The Ishihara Sangyo Kaiun Goshi Kaisha (a shipping company established by the Ishihara Industrial Company), which has strongly competed with the Java Conference since March this year in the operation of its liners between Japan and the South Seas, will shortly commence activity in African waters. It is reported that an agreement for cooperation has recently been reached between the Company and the K.B.M. Line, one of the leading Dutch companies. According to the plans of the Company, its ships are to carry cargo for ports in East and South Africa. The Erie Maru, which is to sail from Kobe on November 21, will carry cargo for Mauritius Island in the Indian Ocean. The cargo will be transhipped at Batavia by K.B.M. liners, which are plying between Batavia and African ports. The freight rates on leading commodities are as follows : Y.50 for silk goods, Y.38 for cotton goods, Y.38 for general dry goods, Y.35 for glass and low price sundry goods.

JAPANESE SHIPPING SUFFERS.—Thousands of hands have been thrown out of work and losses aggregating $100,000,000 have been sustained by Japanese shipping companies largely as a result of the present anti-Japanese movement, according to reports emanating from Chinese sources. The set-back to Japanese shipping in China, it was reported, has been followed by a petition from the Seamen's Union in Kobe to the Japanese Imperial Government for financial assistance in what was termed a serious crisis. The report went on to state that the gold depreciation, decrease in freight and passenger revenues and other factors have contributed to the present state of Japanese shipping in China besides the boycott. A number of Japanese coastal and other vessels have suspended sailings temporarily at least, owing to the acute diminution of freight.

JAPANESE HARBORS.—Mail advices announce a plan to improve 50 Japanese ports and harbors by means of bonds issued for unemployment relief at a cost of 22,000,000 yen (£2,200,000), of which one-half is to be provided by the National Treasury and the other half by the local committees where the ports and harbors are located. The plan has been drafted by the Tokio Home Office. Upon the final approval of that office being given to the draft plan, negotiations will be entered into with the Finance Office to secure its approval. The foregoing plan is in addition to the road plan, for which it is proposed that the Imperial Government shall furnish 20,000,000 yen by means of bonds for unemployment relief, the local committee also providing a similar amount also raised by bonds. There is a further plan for controlling about fifty large and small streams, costing 30,000,000 yen, of which one-half is to be furnish by the National Treasury, to be completed within three years. Out of the fifty ports and harbors which it is proposed to improve, ten will cost about 1,000,000 yen each, as follows:—Misumi, Oita, Sakata, Hososhima, Hiroshima, Shikama, Kishiwada, Uo, Tokushima, and Nichinomiya. The ports and harbors whose improvement will cost between 300,000 and 500,000 yen are to be distributed in different prefectures, at the rate of one or two each, limiting the total number to 40, many of which have already been picked by the Home Office. Others are in the course of selection.

FORGETS SINO-NIPPON ISSUE.—Sino-Japanese friendship was the keynote of the remarks made by the guests as well as the hosts at a reception given in the premises of the Harima Dockyards, Aioi, Hyogo Prefecture, on October 10, on the occasion of the launching of the Chinese cruiser *Ninghai*, 3,000 tons. The guests included General Chiang Tso-pin, Chinese Minister to Japan, who came from Tokyo, Mr. Chow, Chinese consul in Kobe, as well as Vice-Admiral Matsumi Sugiura of the Navy Office, and Governor Koyanagi of Hyogo Prefecture. In all 500 guests were present. Flags of both China and Japan were crossed with each other in decorating the scene. The launching ceremony was successfully conducted, the reception following. There were about 30,000 persons watching the proceedings.

COOL PAINT CHOSEN FOR CORFU.—Thorough tests to discover which color of paint transmits heat least readily resulted in white instead of the usual buff being chosen for the upper works of the new P. & O. liner *Corfu*, which recently sailed on her maiden voyage to the Straits, China and Japan. It was found that white was four degrees cooler than buff. It was stated at a luncheon to Far Eastern shippers, given on board the ship at the London Docks recently, that she had been constructed not only as a first-class passenger ship, but with the idea always in mind that her value as a cargo carrier was not in any way impaired.

INVITES HARBOR EXPERTS.—The possibility of the much-needed improvements in the lower section of the Whangpoo being made in the immediate future is seen in the invitation to Director Wilhelm Sieveking, of Hamburg, and a number of English and French colleagues by the Chinese government to investigate harbor construction in Shanghai.

China's invitation was sent to these experts through the League of Nations. They will proceed directly to Shanghai.

The decision to secure a report on harbor construction in the vicinity of Woosung is the outcome of survey conducted by Mr. Haas recently.

ELECTRICAL

NEW SOVIET TURBINE.—Early in August the fourth turbo-generator, with a capacity of 11,000 kilowatts, began operations at the Kizel central electric station in the Urals. The first tests gave excellent results, and the turbine is working at full capacity.

BOILER CONTRACT FOR BORSIG.—The Nanking Electric Company entered in January 1931, through its representative, a contract for modern boilers for its electric plant with Borsig and at the same time bought one 4,000 k.v.a. Turbo-Generator.

NEW ELECTRIC PLANT.—Kweichow: Permission is given by the Nanking Government to construct a waterworks and electricity plant in Kweiyang, after all the plans and schemes have been submitted to the Government for approval.

TOKYO'S SUBWAY POPULAR.—An enormous number of people in Tokyo now avail themselves of the subway following the opening on November 21 of the section between Manseibashi and Kanda, as the cars operated are more comfortable than the city trams and the fare is exceedingly reasonable—five sen between Asakusa and Ueno, and between Ueno and Kanda, and 10 sen for the whole line. The work on this section, opening of which has met with overwhelming popularity, was commenced in June, 1926, and has been completed at the cost of Y.1,700,000. What made the construction of this short distance particularly difficult was that it crosses the Kanda-gawa, and the first tunnel running underneath a river-bed has been completed here. As the result of the opening of this new Kanda station, the Manseibashi station of this subway line, which is located in an exceedingly inconvenient place, has been abolished.

ELECTRICAL DEVELOPMENT.—Considerable activity is at present being shown in Japan in connection with the extension of the electricity supply industry. The following are some of the more important schemes in progress or under consideration: The erection of a 30,000-kw. thermal power station by the Yamaguchi Prefectural Electric Bureau, at a cost of Y.6,500,000; the erection of a 10,000-kw. thermal power station by the Formosan Power Co.; the extension of the Joshibata power station by the Kyushu Hydro-Electric Co.; the construction of two power stations at Nishikubo and Hoshimata, on the Azuma River, by the Azumagawa Power Co.; the development of approximately 30,000-kw. of hydro-electric power from the Kumano River, by the G.I.R.; the erection of a 40,000-kw. power station to utilize the water from Lake Tazawa, by Mr. S. Nokanao; and the construction of a 10,000-kw. steam or Diesel-engine power station by the Tokyo Municipal Electric Bureau.—*Electrical Review.*

CURRENT FOR SOVIET CITY.—The city of Sverdlovsk, in the Urals, began to receive electric current from the Cheliabinsk power station at the end of July. The Cheliabinsk transmission line, the longest in the country, will play an important role in supplying plants in the Ural-Kuznetz region with power. The electric furnaces of the Verkhusetsk plant, the Ural machine-building factory and other industrial enterprises are already using powerf rom the Cheliabinsk plant.

TRANS-PACIFIC WIRELESS.—Plans to link Tokyo and San Francisco by means of wireless telephony are being considered by various concerns interested in the enterprise according to semi-official reports published in the Japanese papers. The possibility of such a service has been under discussion at the Ministry of Communications since it was first suggested by the American Telephone and Telegraph Company some while ago, project is not likely to be realized in the near future, if left in government hands alone, because of the policy there to cut down expenses in every possible direction.

Various private concerns, however, are reported to be taking an active interest in the proposal. These include the Japan Wireless Telegraph Company and the International Wireless Telephone Company, the latter having sent one of its engineers to the United States early to conduct practical investigations. Although not officially confirmed, it is understood in this connection that the International Wireless Telephone Company is being well supported by Mitsui interests.—*Japan Advertiser.*

CANTON POWER PROJECT.—The Canton Government has decided to form a company for the purpose of building a high tension transmission line from Shumchun to Canton to transmit electric power supplied by the China Light and Power Company of Kowloon.

The Canton Commissioner of Reconstruction will negotiate with the Company with the object of arranging for the carrying out of this plan.

It is believed that the project, if it materialized, will hasten the modernization of the industrial development of towns in the rural districts along the Canton-Kowloon Railway.—*Reuter.*

BROADCAST FOR MISSIONARIES.—Presbyterian missionaries in the most remote parts of the earth may hear messages from their relatives and friends in America hereafter at stated intervals, through the generosity of Station K. D. K. A. of Pittsburgh, by a specially arranged broadcast. This is the first time there has been any such arrangement. The time will be the third Saturday night of each month at 11.15 o'clock, beginning November 21 and continuing through March 19. "Representatives of the Board of Foreign Missions of the Presbyterian Church, New York, are arranging to give a series of radio talks in the near future," said an official announcement made at the Presbyterian Building, 156 Fifth Avenue. "Westinghouse Station K. D. K. A. of Pittsburgh, which is the pioneer broadcatsing station in the world, has initiated a service of great value to the church. It has made possible its world-encircling service to the churches of America so that greetings may be sent to missionary representatives in foreign lands.

MINING

YUNNAN TIN OUTPUT.—At a time when the output of the different tin producing countries is being very closely watched, more especially to ascertain the volume and tendency of production in countries outside the restriction organisation, the fortunes of the tin producing Province of China, Yunnan, are specially interesting. This field, according to the account given of it by Mr. Marshall D. Draper ("M.J.," May 23, 30, etc., 1931) shows probably the highest grade of tin deposits being worked anywhere at the present time, and, of course, the depreciation of silver might be supposed to favor the export of tin, even though silver is apparently no longer an effective currency in Mengtsz. Under these circumstances it is not altogether surprising, despite the very low world price of tin, that production for the first six months of this year registered a quite definite improvement on that for the first half of 1930, the respective figures being 52,713 pikuls (3,137 tons) during the first half of this year, against 47,818 pikuls (2,846 tons) for the same peroid of 1930. Production for the first half of 1929 was 45,033 pikuls of 2,680 tons, so that the first six monthly period for the past three years shows a steady rise though this has not been the case with the production for the whole twelve months.

PROPOSAL IS MADE.—In an attempt to secure the reopening of the Han Yeh Ping Iron Works and the Yangtze Iron Works, as a measure against foreign competition for the supply of raw material to Chinese industries, the Greater Shanghai Chinese Chamber of Commerce recently despatched a petition to the Ministry of Industries which reads in part:—"It is true that the development of industry depends much upon the quality and supply of machinery, but machinery alone cannot do much unless there is a constant supply of raw materials. In China, conditions are really deplorable, and, although China has natural resources in great abundance, most of her supply of raw material is imported. The supply of iron, for instance, is in the hands of foreign merchants, who are in a position to dominate the industrial market. We suggest the restoration of Han Yeh Ping Iron Works and the Yangtze Iron Works, both of which have been suspended for some years.

New P. & O. Liners are Equipped with Yarrow Boilers

Yarrow High Pressure Water-Tube Boilers completed in the shops of Messrs. Yarrow & Co., Ltd., Scotstoun, Glasgow, are installed in the two newly built P. & O. Liners, *Corfu* and *Carthage*, which were launched recently from the yards of Messrs. Alexander Stephen & Sons, Ltd.

The *Corfu* and *Carthage* are both for the China trade of the P. & O. and went into service this Fall. The vessels each are of some 14,000 tons gross, and are designed to attain a service speed of 17 knots. The dimensions of the vessel are 545 feet length overall by 71 feet beam by 46 feet depth.

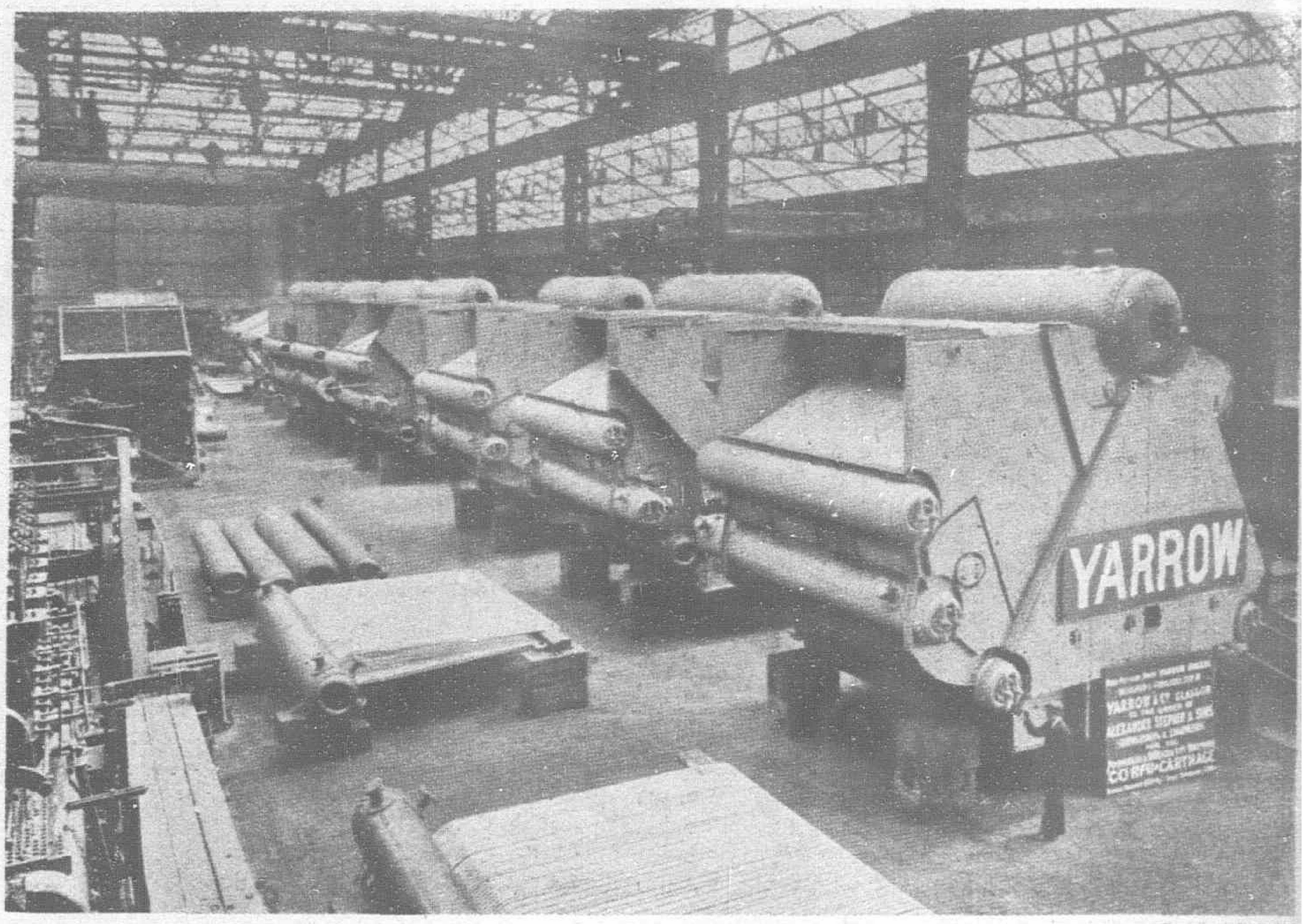
Accommodation has been arranged for 180 first class saloon passengers and 200 second class saloon passengers, and the public rooms and promenade decks for both classes will be exceptionally commodious and will include an open air swimming bath available for both classes, and a protected observation gallery for the first class saloon passengers.

The first saloon cabins will include a number of special de luxe and bath cabins, and a large proportion of single berth rooms, and all the cabins will have natural lighting, ample furniture, and beds of the four post type without upper berths. The second saloon cabins are similar in type, and will also include a number of single berthrooms.

The passenger service system should meet all requirements, and will include an inquiry bureau and printing office, hairdresser's shop, hospitals complete with surgery and staff, ironing rooms for ladies' use, steam laundry, children's rooms and playground and quarters for ayahs or Chinese nurses who may accompany their mistresses.

The cargo holds include large refrigerated chambers, lock-up spaces for mails, special cargo and bullion, and the cargo appliances are designed for the expeditious handling of cargo, with hinged steel covers over the hatches, and four electric winches and derricks at each hatch, designed for loading cargo simultaneously from both sides of the ship. A 20 ton derrick and gear is provided for heavy lifts.

The propelling machinery consists of twin sets of single reduction geared turbines of the Parsons' type, built and installed by Messrs. Alexander Stephen & Sons, Ltd., with four high pressure Yarrow water tube boilers for the main service with two Scotch boilers, all burning oil fuel on the Clyde oil fuel system, and three turbo-electric generators for auxiliary duties.



Installations of Yarrow High Pressure Water-Tube Boilers for new P. & O. Liners

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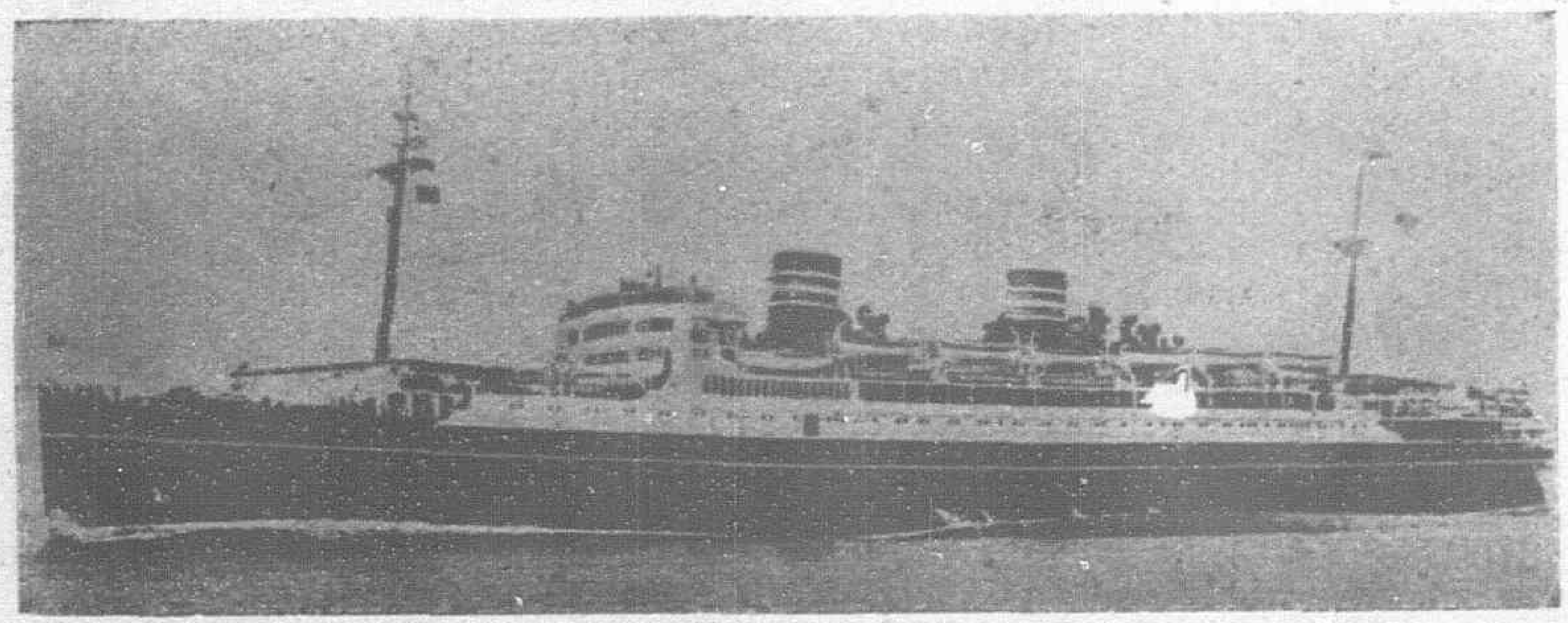

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